STEEL
The Metalworking Weekly

NOVEMBER 21, 1955
Vol. 137 No. 21

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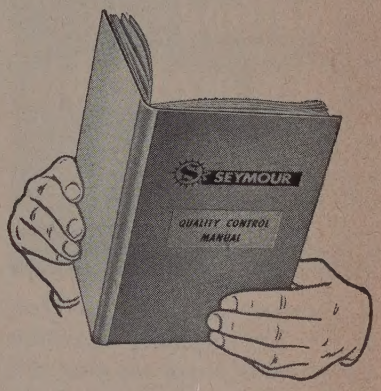
Recipes for RELIABILITY



There's no guesswork in the production of Seymour nickel silver, phosphor bronze and brass. Every step in their manufacture is prescribed—in detail—in a master quality control manual which is "the law" throughout Seymour casting shops and mills.

This is another reason why Industry has come to rely on Seymour to deliver nonferrous metals which are uniform in quality, year in and year out.

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tough sprayed metal

well-known maintenance method now profitable production process

equipment fabricators find tough, high-quality sprayed metals build big bonus pay-offs

Modern metallizing—metal spraying—which for many years has saved millions of maintenance dollars by restoring worn machine parts for thousands of companies, is now helping many others improve their products, cut production costs.

In the production of new equipment, tough sprayed metal coatings provide highly desirable mechanical or electrical characteristics at low cost, in high speed, semi-automatic production.

General Electric, for example, a long-time user of metallizing to provide superior wearing qualities on critical areas of large turbine shafting, now applies sprayed metals to a wide range of its products. Many forward-looking companies have instituted investigative programs in their research and design labs to explore the use of metallizing as a means of giving their products competitive advantages in quality, or performance or price—or all three.

Metallizing may be able to help your company improve its products, economically, reduce machine maintenance costs, cut your bills for corrosion protection. It may pay you well to look into it. In any event you will find it a fascinating subject. Bulletin 51 illustrates and describes "Metallizing—its practical applications"—shows actual work being done in users' shops. We shall be happy to send you a copy.

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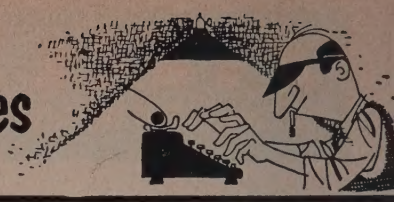
behind the scenes



Partly Read—by Parts?

As you know, STEEL is three magazines in one: It reports metalworking news, production-engineering and markets. Sometimes the reader who is vitally concerned about prices is only vaguely interested in the intricacies of production, whereas the reader who pores over modern heat treating, for example, might exhibit no concern at all over the cost of heavy melting scrap in Chicago.

About 138,000 persons read STEEL. It figures out to four-point-something readers per copy, but we don't usually stress that fact, because it would be an admission that every fifth reader is only a fraction of himself.

The metalworking management people who read STEEL have a remarkably wide range of interests, and we'll confess right now that the editorial staff works up a considerable sweat every week trotting out articles and items to spread before its sharp and perceptive audience. Consider, for instance, the Technical Outlook section: If the editors in charge of that department confuse one alloy with another, or ascribe a wrong date to a process, or transpose two steps in any given process, brother, they are dead ducks.

The cover story this week was cooked up and conducted by Machine Tool Editor Bob Huber. The photograph on the cover is of a machine that can automatically assemble any unit calling for standard electronic components—and how would you like to have one of *those* for your very own? It's just a little old autofab, and it was photographed right in the act of producing printed circuit assemblies for use in air defense computers.

Artist Craves License

Speaking of the technical section reminds us—now, there's a sneaky way of introducing another thought. We were going to talk about artist Tom Welsh, who lays out and illustrates the technical section, and the fact that we were speaking about the technical section had nothing to do with bringing up Tom. It's the employment of such dull cliches t kills communications, oral or writt

Well, Tom was handed a story "What Caused the Forging To Fai (page 96), and he grew quite cited. The article revealed that Dec. 19, 1954, a large forged turb shaft in a Chicago power plant fai killing two and injuring five. cause of the failure has been of gr concern to producers and users large forgings. Last week Allis Ch mers released details of its extens investigations.

"Here," said Tom, "we had a forg shaft flying to pieces with me lurgical sleuths hot on the trail 12 months, and how do I have treat the story? I got to lay it around the metallurgy of a la forging, and the story is a strai piece about production and insp tion!"

Casual thought: Wonder w would happen if the artists took c plete charge of the magazine?

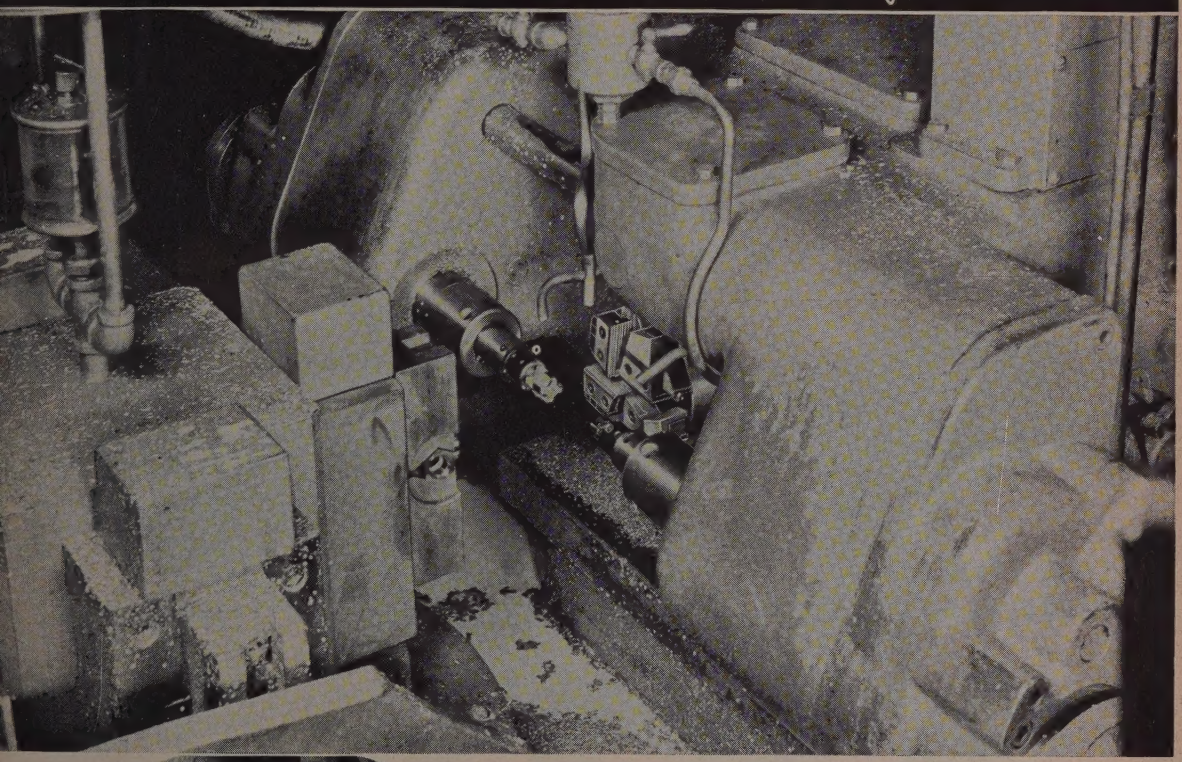
Stainless Award

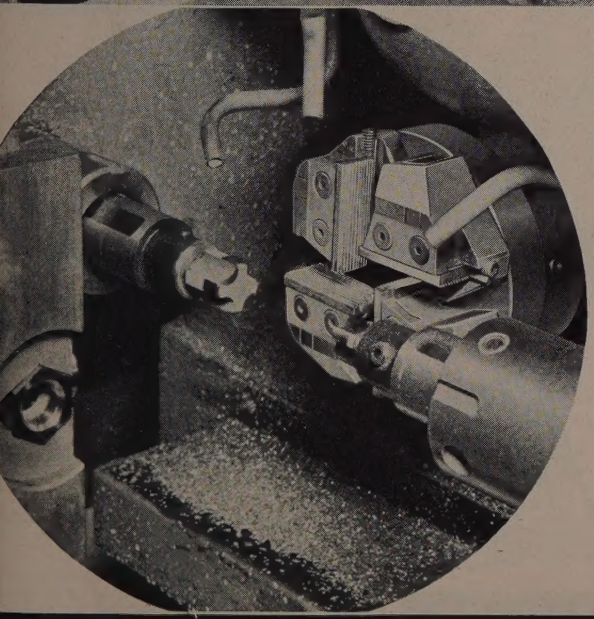
In an attempt to bring more formation about stainless steel industry, Allmetal Screw Produ Co. Inc., Garden City, N. Y., nounced its sponsorship of an ann award to be given to the author the article of most value and inter to those who specify or buy sta less steel parts or components. F prize is a cool $1000. Moreover, Allmetal Stainless Steel Aw Plaque will be awarded to the tor of the industrial magazine ca ing the winning article. Three h orable mention scroll citations p viding recognition to selected tries also will be awarded. Winn of the first annual award will announced by Allmetal on Feb. 1956. You can get additional inf mation about the award by writ to: Secretary, Allmetal Award C mittee, Allmetal Screw Products Inc., Garden City, N. Y.

Shrdlu

(Metalworking Outlook—Page 41)

57% Less Threading Cost
ON AUTOMATIC CHUCKING MACHINE





A *LANDIS* Solid Adjustable Die Head cut the cost of one threading operation in the plant of a large Middle Western manufacturer by 57%.

The operation, performed on a Goss and DeLeeuw Automatic Chucking Machine, required the cutting of a 1 11/16" diameter 14 pitch thread ½" long on cast brass valve bodies. Prescribed tolerances were easily maintained.

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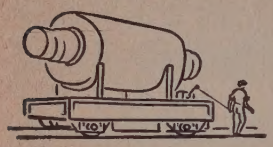
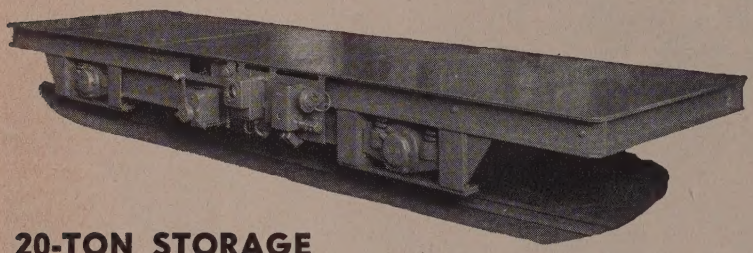
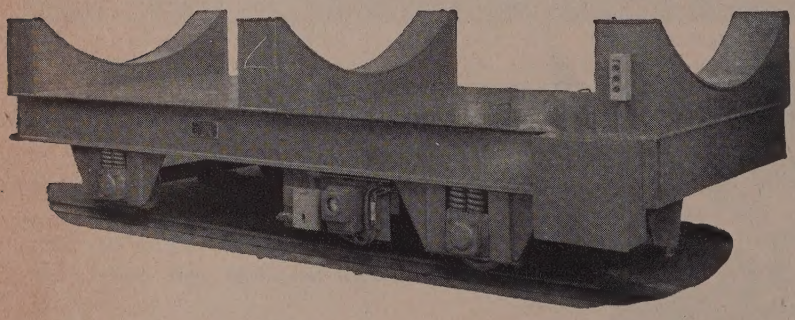


Atlas Safety-Type Transfers provide safe, low-cost service. Available with gas or diesel-electric, cable reel, or storage battery power. Atlas Transfers handle any type of load . . . and the heavier the load, the greater the savings.



20-TON STORAGE BATTERY FLAT CAR



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LETTERS TO THE EDITORS

Two Firms: Same Name

We noticed an announcement, "Empire Steel Opens Plant" (Nov. 7, page 126), about the opening of a steel warehouse and fabricating plant in Denver under the name of Empire Steel Corp.

To eliminate confusion in the trade we request you announce that this new corporation (although of the same corporate name) is in no way connected with Empire Steel Corp., Mansfield, Ohio, a producer of various steel products.

D. D. Hattman
Vice President-Secretary
Empire Steel Corp.
Mansfield, Ohio

Metal Finish Standards Needed

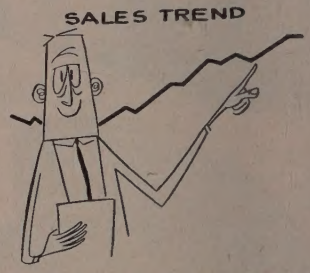
I would like a list or table of the standards which apply to surface finish of sheets, formed or rolled materials and extrusions of steel, aluminum, stainless, etc., after their rolling, polishing or extruding. This would not include acid, plated or generally coated finishes.

Where can I get this data?

Henry A. Nelson
75 West Street
New York 6, N. Y.

• *Write John W. Sawyer, Code 55, Bureau of Ships, Navy Dept., Washington 25, D. C.*

Sales To Continue Strong



We are setting up our sales objectives for next year and are anxious to pass on to our sales organization our general opinion as to what the national trend will be in new steel orders for 1956.

Last year, you gave us your ideas for 1955, and we look forward with interest to your ideas and opinions about 1956.

C. T. Apple
Vice President
Reed Rolled Thread Die Co.
Worcester, Mass.

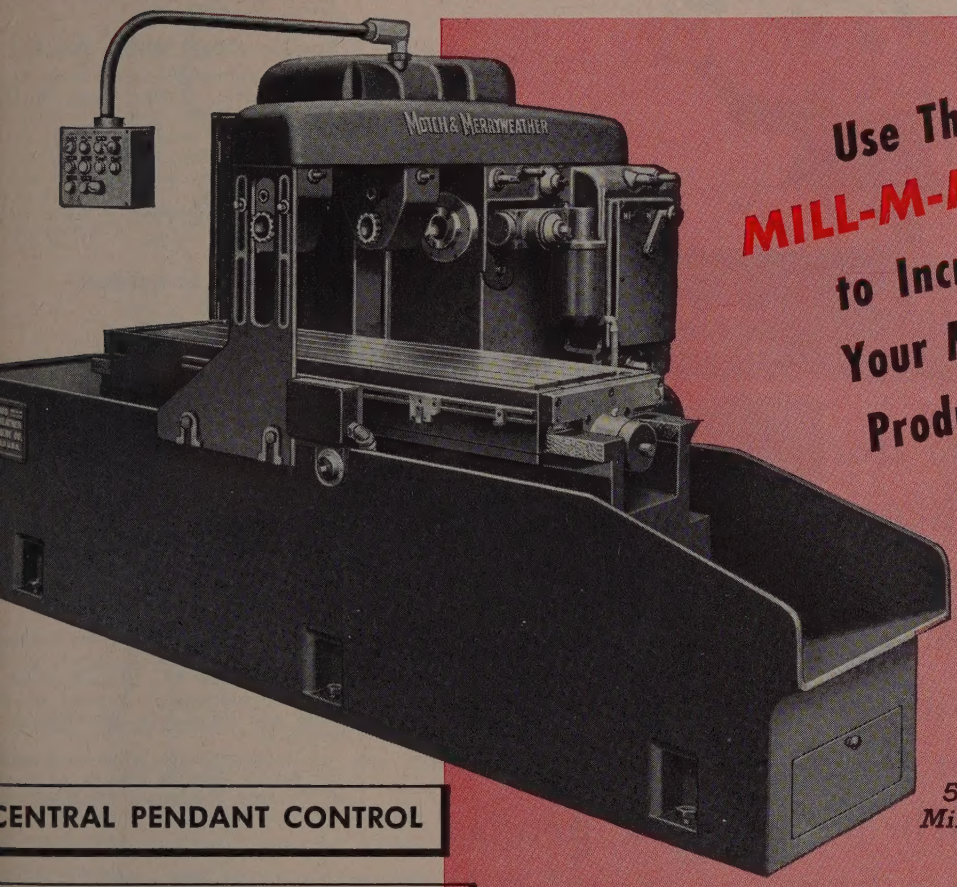
• *Ordering for delivery in the first quarter of 1956 is as strong as it has been in 1955.*

Steel demand will continue strong the first half; some people think it will continue strong in the last half. A decline in demand for automobiles would affect steel demand, but it will be late in January before this can be detected.

Since 1956 is an election year, the "ins" will do everything possible to keep business at a high level. If business slows down, credit restriction

(Please turn to page 12)

ustly Named—the Motch & Merryweather MILL-M-MATIC BED TYPE *Production* MILL



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AGRICULTURAL AND INDUSTRIAL BOARD

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LETTERS

(Concluded from page 10)

would be loosened to allow busines pep up.

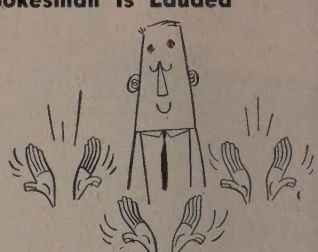
For more details, we suggest you "A Record 1956 Shapes Up" (Oct. page 35) and "Steel Prices Must R (Nov. 14, page 59).

Reader Likes 'Willie Waste'

We were introduced to "Willie Wa in the article, "Saving Dollars in Ma facturing" (Oct. 24, page 104). made such a good impression that feel our employees should become quainted. May we have two repri

D. J. McCull
Assistant to Works Man
ACF Industries
Berwick,

Spokesman Is Lauded



I read the Management at W article, "S. D. Strauss: Editor Tu Salesman" (Sept. 26, page 79), interest.

It is my opinion that the nonfer metals industry would profit if m spokesmen like Mr. Strauss would low the philosophy of communica ideas and information to business industry.

I think STEEL is to be congratul for having selected him as an exam of the type of business statesman wh activities should be encouraged.

Irving Smith K
Public Relations Dir
J. M. Hickerson
New

Story Attracts Attention

Businessmen are giving the nod approval to your article, "Market Fa Where You Find Them and How Use Them" (Oct. 24, page 91). T tell us your detailing of sources the accompanying explanation is best they've seen. We concur.

We have displayed the article pro nently on a bulletin board in our f office with all the related litera tied to your story. It is attractin great deal of attention.

The Director of Field Services wo like 100 copies to distribute to offices and we would like 100 co for general distribution from our of

Zelda W. M
Commercial A
Field C
U. S. Department of Comm
Clevelan

The map, "Metalworking Market the U. S.," offered in this article pears to reflect a wonderful ove picture of the metalworking indu and would be a handy, as well as dec tive, source of information.

I would appreciate your sending of these maps to my attention.

E. H. Sm
Manufacturing Man
Kaiser Aircraft & Electronics
San Leandro,

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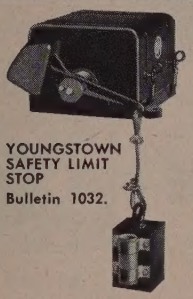
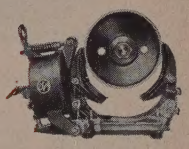


YOUNGSTOWN SAFETY LIMIT STOP
Bulletin 1032.



LONG-LIFE BRAKES for A-c and D-c Cranes.
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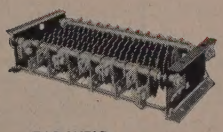

TAB-WELD Plate Resistors
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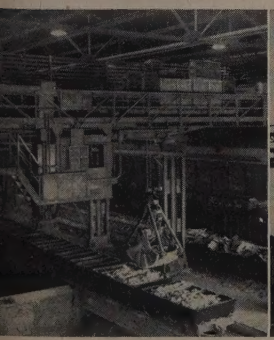
DISCONNECT SWITCHES
Bulletin 1023.



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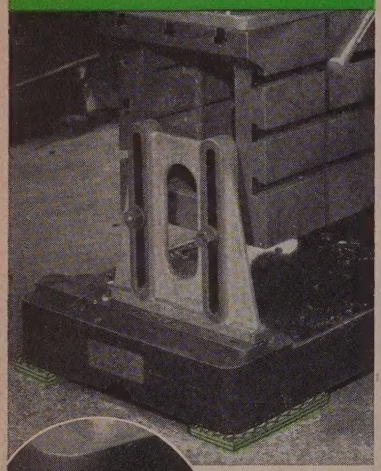

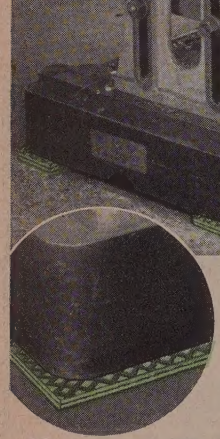

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CALENDAR
OF MEETINGS

. 27-30, **American Institute of Chemical ngineers:** Annual meeting, Hotel Statler, etroit. Institute's address: 25 W. 45th St., ew York 36, N. Y. Secretary: F. J. an Antwerpen.

. 27-Dec. 2, **American Institute of Steel onstruction Inc.:** Annual meeting, Boca aton hotel and club, Boca Raton, Fla. stitute's address: 101 Park Ave., New ork 17, N. Y. Secretary: M. Harvey nedley.

. 28-Dec. 1, **Air Conditioning & Refriger-ion Exposition:** Atlantic City Auditorium, tlantic City., N. J. Information: Clapp & oliak Inc., 341 Madison Ave., New York , N. Y.

5-9, **National Exposition of Chemical In-stries:** Commercial Museum and Conven-n Hall, Philadelphia. Information: Inter-tional Exposition Co., 480 Lexington Ave., ew York 17, N. Y. Manager: E. K. evens.

7-9, **American Institute of Mining & etallurgical Engineers:** Electric furnace eel conference, William Penn hotel, Pitts-rgh. Institute's address: 29 W. 39th St., ew York, N. Y. Secretary: E. H. Robie.

7-9, **National Association of Manufac-rers:** Annual meeting and exhibit, Waldorf toria, New York. Association's address: E. 48th St., New York, N. Y. Secretary: el Sargent.

12-13, **Material Handling Institute Inc.:** nual meeting, Hotel Statler, New York. stitute's address: One Gateway Center, ttsburgh 22, Pa. Managing director: R. nnedy Hanson.

12-16, **Atomic Exposition and Nuclear gineering & Science Congress:** Public ditorium, Cleveland. Information: Inter-tional Atomic Exposition, 931 Book Bldg., troit 26, Mich.

13-15, **Industrial Truck Association:** Win-meeting. Hotel Statler, New York. As-ciation's address: Washington Loan & ust Bldg., Washington 4, D. C. Manag-director: William Van C. Brandt.

3-6, **Institute of Scrap Iron & Steel Inc.,** nual meeting and exhibit, Sherman hotel, icago. Institute's address: 1729 H St. W., Washington 6, D. C. Executive vice sident: E. C. Barringer.

9-13, **Society of Automotive Engineers .:** Annual meeting, Sheraton-Cadillac ho- and Hotel Statler, Detroit. Society's ad-ss: 29 W. 39th St., New York 18, N. Y. cretary: John A. C. Warner.

11-14, **American Road Builders' Associa-n:** Annual convention and exhibit, Munici- Auditorium, Miami Beach, Fla. Associ-n's address: World Center Bldg., Wash-gton 6, D. C. Executive vice president and cretary: Eugene Reybold.

23-25, **Truck-Trailer Manufacturers As-tion Inc.:** Annual meeting, Edgewater lf hotel, Edgwater Park, Miss. Associa-n's address: 710 Albee Bldg., Washington D. C. Managing director: John B. Hulse.

23-26, **Plant Maintenance & Engineering ow:** Convention Hall, Philadelphia. In-mation: Clapp & Poliak Inc., 341 Madi-Ave., New York 17, N. Y.

24-27, **American Management Associa-n:** General management conference, Fair-nt hotel, San Francisco. Association's dress: 330 W. 42nd St., New York 36, Y. Vice president-secretary: James O. e.

26-27, **Blast Furnace & Coke Association the Chicago District:** Winter meeting, Prado hotel, Chicago. Information: W. Bruce, chief engineer, Republic Steel rp., 11600 S. Burley Ave., Chicago 17, Ill.

29-Feb. 2, **Associated Equipment Dis-utors:** Annual meeting and exhibit, Con-Hilton hotel, Chicago. Association's dress: 30 E. Cedar St., Chicago, Ill. ecutive secretary: P. D. Hermann.

1-2, **Midwest Welding Conference:** Armour search Foundation, Illinois Institute of chnology, Chicago. Information; Harry wartzbart, Armour Research Foundation, W. 33rd St., Chicago 16, Ill.

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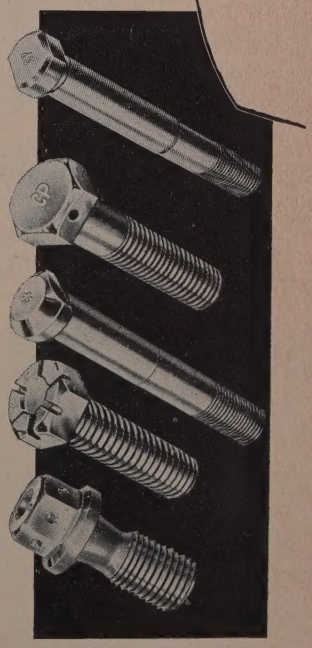

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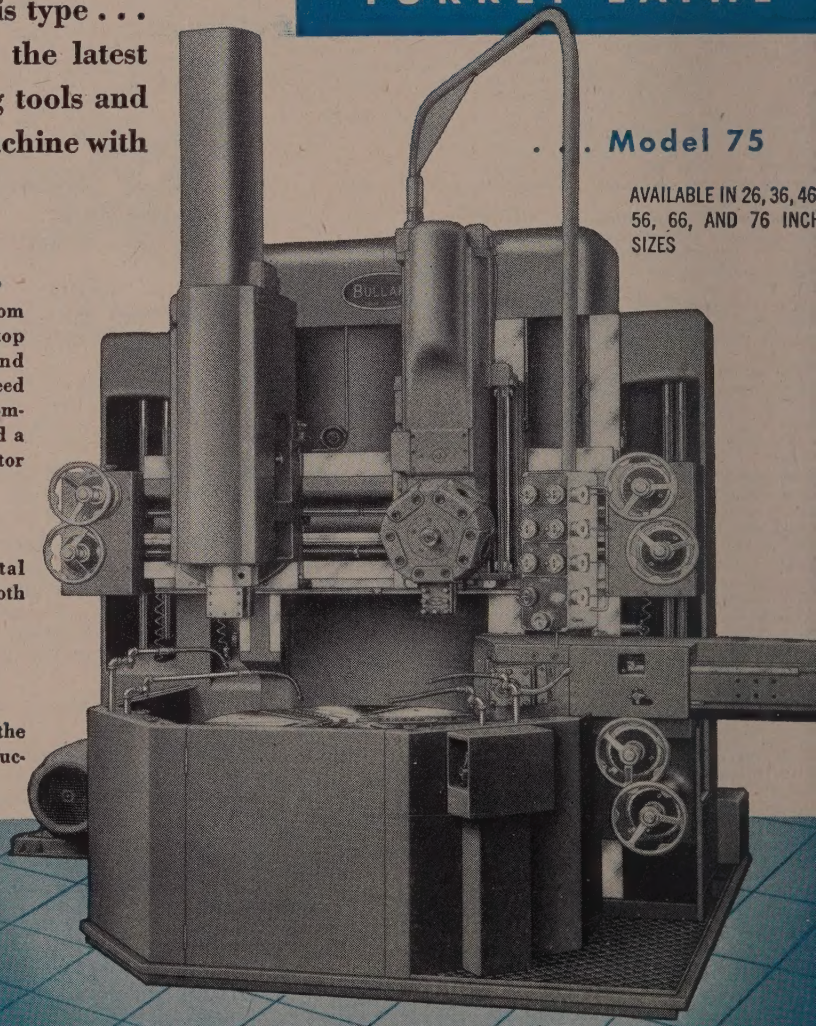

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1955: Normal Auto Year?

Are 1955 auto sales abnormally good? No, says W. J. Simons, Chrysler Corp.'s treasurer. "On the contrary, 1955 is the first year in the entire postwar period that the industry and the economy did not face substantially abnormal conditions of one form or another. It is the first year to give concrete evidence of the underlying strength of consumer demand for automobiles." Automakers plan the largest November-December assemblies in history—1,458,000 cars in the final two months.

All About Ford

After scornfully turning down Ford Motor Co.'s offer last summer for a stock purchase plan for hourly employees, the CIO's UAW now wants the program . . . Ford's 1955 earnings before taxes "will push close to $1 billion," reports *Newsweek*. Ford's 1955 net after taxes "should hit $350 million or somewhat better," the magazine says. The best previous year in Ford's history was 1950, when earnings after taxes reportedly were $250 million.

GNP Soars

Look for the gross national product to hit a record annual rate of $395 billion or better in the fourth quarter. Personal spending and plant expansion sparked a rise in GNP (the nation's total output of goods and services) to a new high annual rate of $391.5 billion in the third quarter.

Construction, Too

Record construction outlays totaling $44 billion will come in 1956, predict the Commerce and Labor departments. That's a 5 per cent hike over the expected $42 billion to be spent on construction this year. The estimate for 1956 would make it the ninth-straight year for record-smashing totals. But the rate of increase in 1956 would be less than in 1955. Major reason: Housing expenditures are leveling out.

Another Steel Expansion

National Steel Corp. will add 1 million tons to its steelmaking capacities in the next three years. It will spend $200 million to $225 million to add 100,000 tons of capacity in 1956, 500,000 in 1957, 200,000 in 1958 and 200,000 in 1959. Slightly more tonnage will be added to National's Great Lakes facilities than to its Weirton units. These additions will just about exhaust the physical possibilities of expansion at both plants, comments National's chairman, E. T. Weir. The next step: An entirely new plant,

hnical Outlook—p. 91 Market Outlook—p. 125

possibly to be built in the 1960s. National now has a 6-million-ton capacity, 3.3 million at Great Lakes and 2.7 million at Weirton.

Troubles in Plates

Watch for more steel mill scheduling troubles as the result of the Washington decision to give the St. Lawrence Seaway defense priority. That ruling will give seaway contractors the right to put ratings on their steel orders, primarily for plates and structurals. The chance that any of the allotments to be issued by the Office of Defense Mobilization will hit jammed mill schedules before April gets more remote each day.

Slower Labor Growth

From the end of 1951 to the beginning of 1955, U.S. labor unions signed up little more than 1 million new members. About 20 per cent of that gain came among Canadian affiliates. From 1935 to 1945, union membership shot up from 3.5 million to nearly 14.5 million. Since 1945, gains have been more modest, to bring U.S. and Canada membership now to about 18 million, reports the Bureau of Labor Statistics. These six unions account for one-third of the total: CIO autoworkers, 1,239,000 members; CIO steelworkers, 1,194,000; AFL teamsters, 1,231,000; AFL carpenters, 804,000; AFL electrical workers, 630,000; and AFL machinists, 864,000.

Economy in the Pentagon

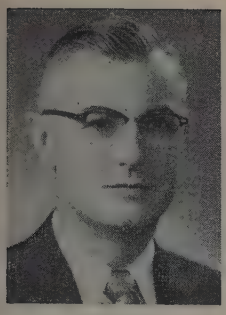
The Defense department is in an all-out drive to save money. Contemplated actions: Better management of research and development; a changed policy on the mobilization base, particularly in the purchase of machine tools; a slowup in deliveries of some aircraft, notably cargo planes and some combat units and engines which haven't worn out so fast as expected.

Ground Rules

You can expect these ground rules to apply when a federal agency is considering bids and foreign applicants are involved: Six per cent will be added to all foreign bids before comparing them with competitive U.S. bids. An additional six per cent will be added to the foreign price when the U.S. bid comes from a labor surplus area. In the first application of the new ground rules, four foreign firms were awarded contracts for electrical equipment, with evaluated bids that were lower than those of domestic manufacturers from labor surplus areas.

Straws in the Wind

A. M. Byers Co. faces another stockholder showdown as insurgents have again asked for a special meeting . . . Packard-Clipper Division of Studebaker-Packard Corp. and the CIO autoworkers have reached a labor agreement patterned after the Ford contract . . . Czechoslovakia will buy 900 Renault cars a year from France; parts will be sent to that Iron Curtain country and vehicles will be assembled there . . . Copper setasides for the first quarter will hit 116 million lb, up 8 million from this period.



Leasing: On Ice?

Leasing, an infant but promising marketing device for industrial equipment, is being strangled by bureaucratic fiat.

The negative approach adopted by the Internal Revenue Service and promulgated in its bulletin No. 35 last August is discouraging manufacturers. A survey by the editors of this magazine (Page 52) shows 80 per cent of equipment builders with leasing plans are withdrawing from the field, or are curtailing their leasing activities.

We believe that is unfortunate. Leasing promised to become an important marketing method. To capital goods manufacturers, it offered a means of enlarging outlets for equipment. To users, it promised even more benefits. It could help conserve working capital, or make it possible to get equipment when working capital was not available. It could provide equipment needed for experimental or short-run manufacture. It sometimes offered tax advantages, particularly the postponement of tax liabilities.

Industry was educated to leasing during wartime. Metalworking companies drafted to defense work alien to their normal production were not required to make huge investments in special equipment. Often, the government bought the equipment and leased it to the contractor for the duration of the defense job.

During the post-Korean adjustment, machine tool builders and other manufacturers of industrial equipment became interested in leasing and tried to make it a permanent part of our distribution system.

A major obstacle was uncertainty—what was the attitude of the Internal Revenue Service on the tax aspects of leasing? Industry asked for clarification, hoping to get straightforward answers in bulletin 35. What they got was a document that raises more issues than it settles. IRS mainly is concerned with the possibilities of abuses. It fails to indicate what is permissible.

As a result, many companies are putting their leasing plans on ice until the bureau comes up with positive and realistic rulings and interpretations. Others are continuing their programs in the hope that executive or judicial clarification will be forthcoming. To would-be lessors, we make these suggestions:

Protest the ambiguities of bulletin 35 to the Internal Revenue Service.

Try to get advance clearance for your individual leasing arrangements. Review your existing plans as carefully as possible. Don't counsel your customers. No one can anticipate IRS rulings.

Remember that when you sell to a leasing company, it still is your product in the eyes of the user. You still have customer liability.

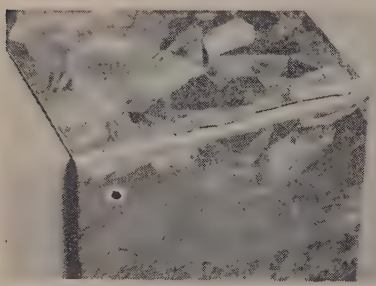
Walter J. Campbell

MANAGING EDITOR

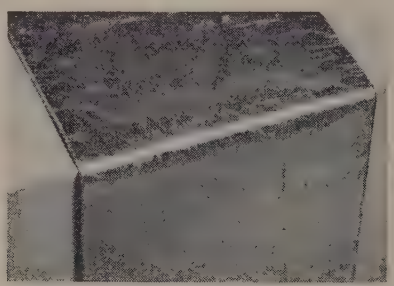
Can your Galvanized Sheets pass the "bend test"?

Just take a piece of the galvanized you're now using—bend it back and forth a few times. Do the same thing with a sample of Inland Ti-Co (which we'll gladly send you). Now look at the coating where the sheets were bent. We know the Ti-Co didn't flake—but did *your* galvanized? You can see for yourself why Ti-Co will improve your products, cut manufacturing costs and practically eliminate rejects.

Here are results of identical laboratory-controlled bend tests:



CONVENTIONAL "POT-DIP" GALVANIZED. *See where coating cracked and flaked off. Reason: brittle alloy layer which exists between zinc coat and steel.*



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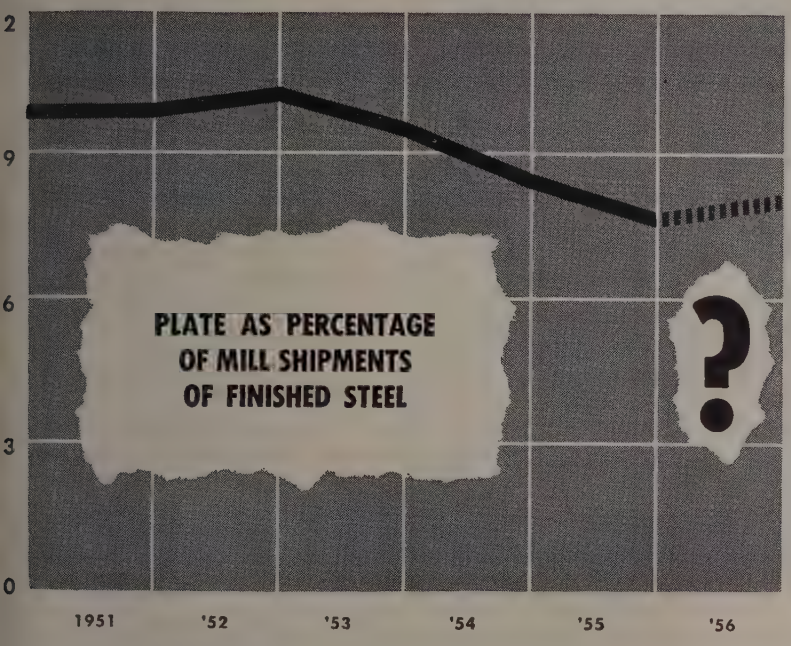


With unfilled orders spilling over into 1956 . . .

Steel Plate Shipments Lag

THE SHORTAGE of steel plate is pproaching famine levels. Orders re stacking up so fast that pro-ucers are already closing books or the first quarter of next year. There's little immediate chance of nprovement.

While boosting ingot capacity nore than 20 per cent between 951 and 1954, steel companies in-reased plate capacity only 4 per ent. In fact, plate capacity has eclined more than 2 million tons nce 1945. But producers are not onvinced capacity is inadequate handle a "normal" market.

Why?—Many steel plate users -such as shipbuilding and mili-ary tanks—are notoriously unpre-ictable. Their activity cannot be elated to the normal growth of etalworking. In 1954, steel plate ipments were down 14 per cent om 1948, while metalworking ales were up 56 per cent. One xplanation for the current pile-p is that sizable orders from ese customers and from the rail-ad freight car programs are com-g in simultaneously.

Cost — Steel plate does have some steadier important customers, machinery and construction among them. But when tonnage is required to satisfy more than these markets, plate has to compete with other steel mill products for every ton of ingot.

In wartime, the government steps in with orders for strip mill plate. In 1953, for example, at the height of the Korean War, plate production was better than 1 million tons above the industry's rated capacity for this reason. But in normal times, no steel company is likely to divert much strip mill steel to plates, when it can process it further into cold-rolled sheet and make better profits.

Planning—The consensus of producers is that while the present plate situation may be painful to fabricators, it is probably temporary. Most of them have a wait-and-see attitude. Of the major platemakers contacted by STEEL, only one plans any addition to capacity, and it's still not ready for an announcement.

Any installation being planned could have little effect before 1957. One other company hopes to step up production through improved operating techniques. On Dec. 1 Colorado Fuel & Iron Corp.'s Claymont Division will get its 180,000-ton mill back into action, after a five-month time-out for repair. None of these plans can have much influence on the immediate situation.

Underestimated? — It's possible that platemakers may be unduly skeptical of the long-term health of their market. Activity in the machinery and construction fields will be pushing records again in 1956. A major new round of pipeline building may be coming. One Canadian gas pipeline alone will take as much plate as the U. S. industry can turn out in 2.5 months.

Major expansions are predicted in the chemical and process fields. Starting the ball rolling, Standard Oil of New Jersey will spend $300 million on refinery expansion next year. And shipbuilding is perking up. Arthur S. Flemming, defense mobilization director, is keeping the expansion goal for heavy steel plate open—making such facilities the only steel mill equipment still eligible for fast tax write-offs.

Short Term — Fabricators take some comfort in predictions that the auto industry may drop its take of cold-rolled sheet substantially in the third quarter, 1956. That could make more plate available almost immediately. Another possibility: Demand may push the market price of plate high enough to warrant more strip mill plate output. Foreign plate is base-priced $50 a ton above the domestic market. All that comes in is being snapped up. The situation makes plate one of the leading candidates for spot price increases predicted in STEEL's Nov. 14 issue, page 59.

Builds Refractories Plant

Harbison - Walker Refractories Co. has completed construction of a plant at Leslie, Cecil county, Maryland. It will produce silica refractories.

Granite City Boosts Output

Illinois steel company plans 30-per-cent addition to ingot capacity by 1958. The program will be built around a new blast furnace and improvements to open hearths

GRANITE City Steel Co. will boost ingot capacity more than 300,000 tons by 1958. Its capacity today is 1,180,000 ingot tons.

John N. Marshall, president and board chairman, explains: "In effect, we will be rounding out our production facilities. Our hot-rolling mills can handle more steel than our open-hearth furnaces can produce. By increasing blast furnace and open-hearth capacity, we will boost current shipments substantially, without the tremendous cost involved in building wholly new facilities."

Benefit—The first effects of the 30-per-cent expansion program will be felt late next year, when hot-rolled coil and sheet output will be stepped up. Nearer the end of the program, Granite City will also be able to boost output of cold-rolled sheet.

Koppers Co., Pittsburgh, will start building a new blast furnace for the expansion this month. Its capacity will be about 1200 tons of pig iron a day, twice that of Granite City's smaller blast furnace—to be torn down to make room for the new unit. The new furnace, which will have a hearth 25 ft in diameter, will go into place next March and will be blown in some four months later.

Time Savers—Granite City will also step up the capacity of its open hearths. Doors have been redesigned to permit use of 61-cu-ft charging boxes for scrap loading. Combined with additional pig iron from the new blast furnace, this and other improvements are calculated to cut steelmaking time.

Granite City's main offices and plant are across the Mississippi river from St. Louis, in Granite City, Ill. Primary market areas are St. Louis, the Midwest and the Southwest.

Steel Plant in Peru

Peru's first steel plant will be in operation by this time next year.

Railroad Crossings Will Be Smoother

Erie Railroad workers put center section of rubber and steel crossing in place at Salem, O. Made by Goodyear Tire & Rubber Co., the rubber slabs are bonded on 7-gage steel, replacing the traditional materials

Located at the port of Chimbo (262 miles north of Lima), t $25-million plant is being financ by French capital. It will ha an initial annual capacity of 6 000 tons, which can be expand to more than a million tons a yea

Power comes from a hydroele tric project being built in Can de Pato, 87 miles inland.

Ramseyer & Miller Inc. (Ne York) engineers are consultan for the Santa Corp., a Peruvi government agency in charge the dual project.

Builds Furnace in Birmingham

U. S. Pipe & Foundry Co. w build another blast furnace at i Birmingham plant.

Construction on the multimilli dollar project starts in about thr weeks. Finish date is around Jun 1957. This is the company's fif and largest furnace in the are It will increase capacities from 5 000 to 80,000 tons per month.

Rust Engineering Co. of Birm ingham was awarded the contra

Ore Boats Set Shipping Record

Pittsburgh Steampship's 59 o carriers have hauled some 2 million tons of ore this year— peacetime record and the four best year in the history of th U. S. Steel Corp. division.

Its record haul was 27.4 milli tons in 1953 during the Kore War.

The last cargo of ore probab will be loaded about Nov. 27. Mo of the boats already are putting for the winter. Three Pittsbur boats will haul limestone in La Michigan until about Dec. 15.

Link-Belt and Syntron Merge

Link-Belt Co., Chicago, h merged with Syntron Co., Hom City, Pa. Link-Belt makes ma rials handling, processing a power transmission machine Syntron, which will be operated a subsidiary of Link-Belt, mak an extensive line of feeders a other equipment using pulsati magnetic vibration for the co trolled movement of materials. also produces selenium rectifie portable power tools, shaft sea and miscellaneous allied produc The consolidated firm plans to

oduce several new products and enlarge its manufacturing fa-ilities.

uys Hydraulic Press Line

Farrel-Birmingham Co. Inc., An-onia, Conn., acquired the business the Press Division of Watson-illman Co., Roselle, N. J. The urchase did not include any por-on of the Roselle plant where Vatson-Stillman, a division of H. . Porter Company Inc., will con-nue the manufacture of other roducts.

ord Expands St. Louis Plant

Ford is increasing the size and roduction capacity of its St. ouis Mercury plant by more than 5 per cent. Two new wings and new bay extending the full ngth of the main assembly build-g will be added. This will bring ie manufacturing area up to ore than 1,070,000 sq ft. Work scheduled to be completed in ctober, 1956, says F. C. Reith, eneral manager of the Mercury ivision and vice president of ord Motor Co.

The company also announced quidation of its wholly owned ubsidiary, Wood Bros. Inc., Des Ioines, Iowa. The plant, operat-d by Ford's Tractor & Implement ivision, with headquarters in Bir-ingham, Mich., will continue to roduce major types of harvest-g equipment. Irving A. Duffy, ord vice president, is divisional eneral manager.

hrysler Buys Parts Firm

Chrysler Corp., Detroit, ac-uired the plants, equipment and ventories of Universal Products o. and its wholly owned subsid-ary, Formetal Co. Purchase price as more than $3.5 million. The roperties will be operated as the etroit Universal Division under ie direction of R. S. Bright, gen-ral manager of the corporation's upply Division. Universal Prod-cts makes automobile drive shafts nd their components, including niversal joints, in Dearborn, lich. Formetal makes stampings nd forgings at its plant in Ecorse, lich.

Ford assembly plant at Louisville is new addition as . . .

Automakers Expand Again

AUTOMOTIVE'S Big Three are still building.

Chrysler Corp. plans to spend more than $1 billion for expansion in the next five years.

L. L. Colbert, Chrysler president, says the money is going into capital improvements and expansion exclusive of tooling. The program will include facilities for making passenger car bodies, construction of new assembly plants, new office buildings, an enlarged engineering program and expansion and modernization of engine, transmission and parts plants.

More for Research—Mr. Colbert adds that Chrysler will push research on gas turbine engines, electronics, and nuclear and solar energy. "It may well be that if the company continues to move in the years ahead as it has in 1955, we will find it necessary to revise our investment plans upward," Mr. Colbert asserts.

Another Ford Plant—Ford Motor Co. also is slicing off another chunk of its $3.7-billion post war expansion fund. The company will build a 1.2-million-sq-ft plant near Columbus, O. It will turn out steering gear apparatus and parts.

While the cost of the project has not been announced, some sources estimate the building alone will run close to $14.4 million.

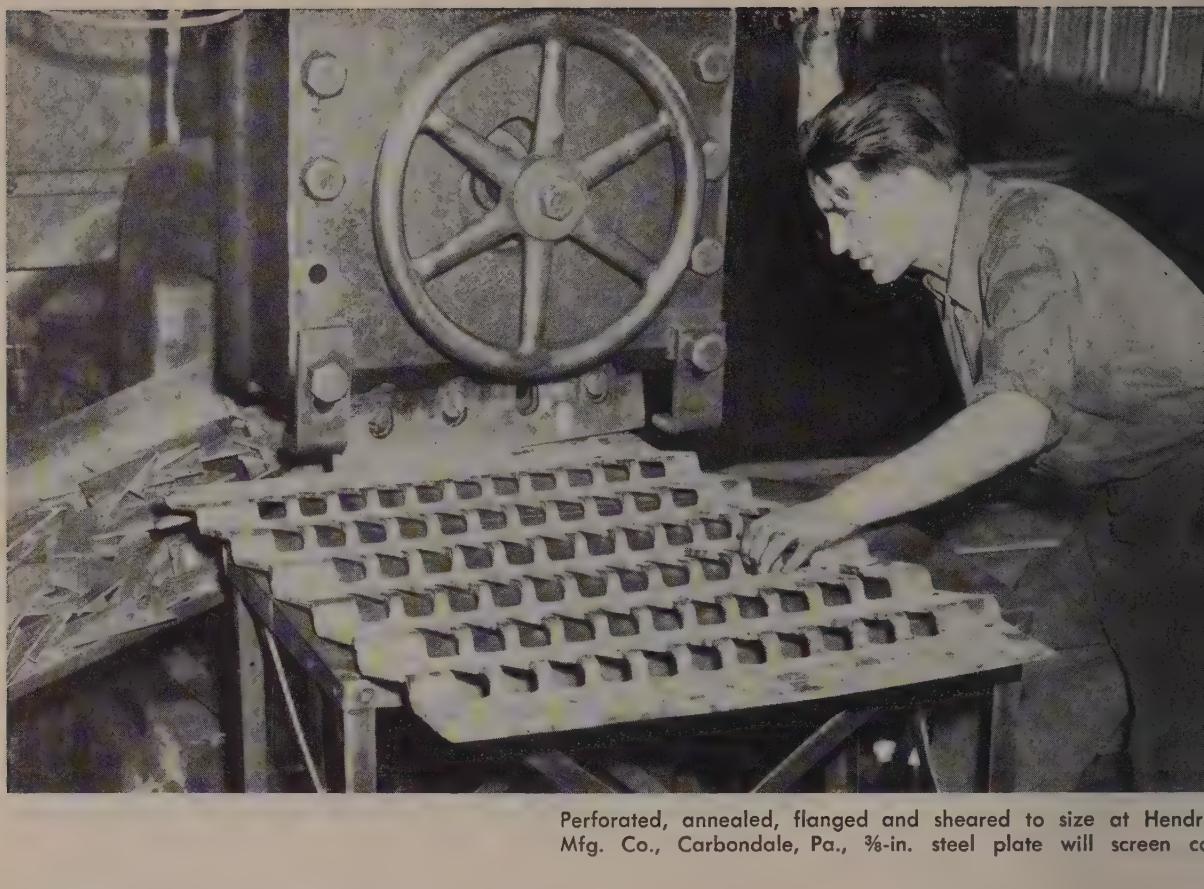
Right Now—Ford is waiting routine re-zoning approval from the Columbus city council. Construction is expected to start this winter. The plant will be completed by mid-1957, according to A. R. Wardrop, general manager of Ford's General Manufacturing Division in Dearborn, Mich.

Meanwhile — General Motors Corp. is noncommittal, following the Senate Committee's hearing on size and structure of its organization. GM has put some $4 billion into expansion programs here and in Canada since World War II.

Late GM additions are stamping plants at Marion and Mansfield, O.

GM Buys Toledo Factory

General Motors Corp.'s Chevrolet Motor Division, Detroit, purchased Martin-Parry Corp.'s factory at Toledo, O., as an added facility for the manufacture of automatic transmissions.



Perforated, annealed, flanged and sheared to size at Hendr
Mfg. Co., Carbondale, Pa., ⅜-in. steel plate will screen c

Biggest customers are having a good year so . . .

Perforated Metal Sales Rise

PRODUCERS are confident for next year, too. Most perforated metal firms report business is better than last year's and expect further increases. Typical comment: "1956 looks excellent," says William Wegner, sales manager, Standard Stamping & Perforating Co., Chicago.

Prime reason for the bright outlook: Biggest users are auto and farm equipment makers and builders of screening equipment used by producers of coal, gravel and crushed stone. Business in those industries is good to terrific this year, should pick up more in 1956 (except perhaps autos, but others will take up the slack).

Materials Short—To stretch a point, business may be a little too good. Steel is the biggest tonnage item that the perforators use; most say their biggest business problem is to get enough steel.

Another headache: Customers want delivery "day before yesterday, and we can give it to them if they are willing to pay for the service," says John C. Eidt, president, Manhattan Perforated Metal Co. Inc., Long Island City, N. Y.

Deliveries — Ordinarily, though, deliveries run three to five weeks, longer if the raw material is an especially tight one. "For example," says one producer, "on Monel and similar alloys the deliveries being promised are August, 1956."

As in other metalworking lines, technological improvements have come to perforating. "Engineering research has accomplished some spectacular results," states J. E. Fuller, president, Harrington & King Perforating Co., Chicago. "The rule of thumb that the dia eter of a hole punched into a sh of steel cannot exceed the thi ness has been far exceeded. E perimentally, we have punched ⅛-in. round hole in ⅜-in. steel.

Buying—Many perforating m chines are special equipment. S eral firms design their own; a f even build them.

"Our new equipment buying c tinues at a rather steady rat says T. A. Warner, sales manag Hendrick Mfg. Co., Carbonda Pa.

Prices—Perforated metal pri are due to take a jump soon. Sa one executive: "There are co paratively few perforating co panies in the country. Desp this, we all have sharp pencils f desirable business. Our pric definitely has not kept pace w increases and prime costs, but c continuous efforts to modify pr ent equipment has allowed us continue operating at a fair pro If raw materials prices go up, will not be possible to hold the l pricewise."

ere's a hot prospect for a sales boom . . .

lectric Heating: Sales Up

R CONDITIONING is giving a boost to the electrical heating siness. It has made summer peak load season in many as. To balance out, many utili- are actively boosting electrical ting.

The National Electrical Manu- turers Association, New York, s 58 per cent of power suppliers or electric heating, 26 per cent neutral, only 16 per cent are ainst it.

Installations — About 300,000 mes are completely heated by ctricity. About 40,000 to 50,-) new installations are being ded each year. Electromode rp., Rochester, N. Y., says: he industry is just around the ner—watch sales snowball."

Another company, not in exist- e six years ago, sells over $1 llion worth of radiant heating nels a year (made of glass, they e mounted on walls). Sales have t scratched the surface, says e company.

Radiant panels and wall-mount- ed convectors make up about 60 per cent of installations. In many northern areas panels were first on the market and got off to an early sales lead.

The other 40 per cent are base- board and radiant systems. They use resistance wire embedded in plaster ceilings, or in prefabricat- ed panels for ceiling installations. They are growing fast in all areas; it's predicted that eventually they may make up 65 to 70 per cent of all installations.

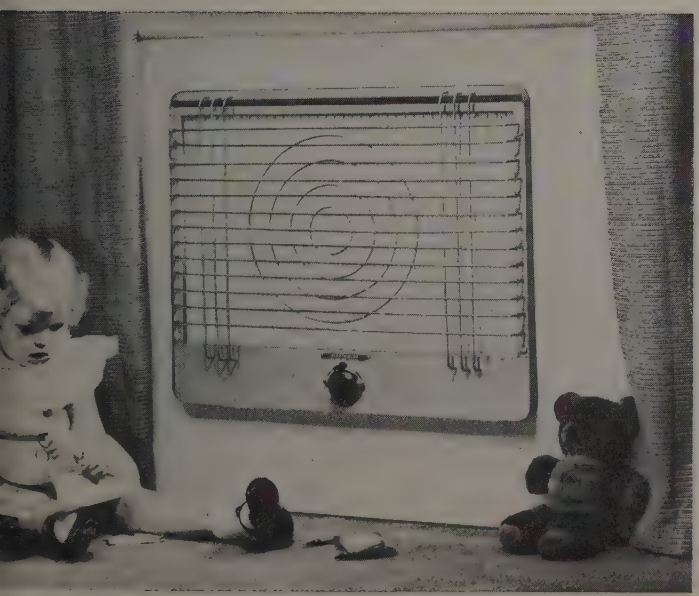
Another Competitor — Sales of heat pumps started in Florida and the Gulf states in 1951. Now they have hit the big cities in the North.

The heat pump uses an electric motor to run a compressor. In summer, it extracts heat from in- side the house and pumps it out- side. During the winter, heat is taken from an outside source, such as air, the ground or a well. The outside coil frosting problem seems to have been solved by a new de- frosting process.

Installations are divided evenly —4000 units are in homes, 4000 are in businesses. But home sales (now 60 per cent) are climbing.

Installed costs range from $1800 to $3000. Units are of 3 or 5 hp. Most systems cut in coil heaters to supply additional heat when the outside temperature drops below 15 to 25° F.

Sales next year are expected to double this year's. General Elec- tric Co. estimates that industry sales in 1965 will be 300,000 units. By then, 1¼-million heat pumps are expected to be in operation.



ctric heating (here wall panels) is a fast growing newcomer

Businessmen Pick Issue

More than 4800 businessmen be- lieve that two legislative issues, tax revisions and reductions, will have greatest impact on the com- petitive enterprise system.

A survey by the U. S. Chamber of Commerce asked industrialists which ten legislative issues facing the next session of Congress would most affect the business world.

Federal and state right-to-work laws and retention of flexible farm price supports ranked second and third.

An expanded federal highway system and federal-versus-private development of water resources were fourth and fifth.

The other five issues, listed in order, are: Laws governing wel- fare funds, expanded social secur- ity coverage and rates, wider min- imum wage coverage, efforts to broaden federal aid for school con- struction and elimination of con- trol over independent producers of natural gas.

Germans Boost Diesel Output

Monthly production of air-cooled diesels has hit 20,000 cylinder units at Kloeckner - Humboldt- Deutz A. G., Cologne, Germany.

Production for the first ten months is 65 per cent over the same period of last year.

Hans K. Breustedt, vice presi- dent of Diesel Energy Corp., New York, the U. S. representative of the German firm, says output has jumped from 1900 engines in 1947- 48 to 38,000 in 1954-55. The av- erage horsepower is 29.6, almost twice what it was in the earlier period.

IRS Bulletin 35 deals a . . .

Blow to Equipment Leasing

"WE ARE now 'out of business' on leasing until the Internal Revenue Service modifies its rules."

So says Cherry-Burrell Corp., Chicago. The "rules" are the new Revenue Rulings No. 55-540, 541 and 542 contained in Bulletin No. 35 of the Internal Revenue Service, dated Aug. 29, 1955.

Troubles—In a survey of metalworking companies that do leasing, STEEL finds that 80 per cent believe that Bulletin 35 has or will hurt industrial equipment leasing. Some 20 per cent think it will have no effect. Nobody thinks it will help.

Says J. A. Swaney of Harris-Seybold Co., Cleveland: "Prior to Bulletin 35, leasing was well on its way to assuming a definite place in the marketing of heavy industrial equipment, but that ruling has placed a shadow over the entire program. Until a test case is carried to the U. S. Supreme Court, leasing must be considered to be on ice." Says Kenneth W. Palmer of Chambersburg Engineering Co., Chambersburg, Pa.: "Bulletin 35 appears to raise more issues than it settles."

The Issue — What's the furor about? It has been building steam steadily in the three months since Bulletin 35 came out. It was IRS's long-awaited statement of its position on the tax aspects of leasing. The first portion (Ruling 55-540) is general and lists a series of criteria, adopted for the most part from language in landmark court decisions. They determine whether an agreement is a lease or a conditional sale. The next two parts (55-541 and 542) are primarily examples, presumably based on the general criteria of 540.

Industry had hoped that with this statement the government would:

1. Clarify its position on when a lease is a lease, and when it is simply a conditional sale. (If a "lease" is ruled a conditional sale, tax postponement advantages of the "lease" disappear.)

2. Modify its stand, so that in lease accounting depreciation methods other than the straight-line method are allowed.

3. Simplify its language and be more positive in its examples, so that its rulings can be better understood.

Results—On the conditional sale issue, "the restrictions are rather severe, and, in my opinion, will make most existing leases ineffective," says L. J. Skoner of DoAll Co., Des Plaines, Ill.

"It narrows, not broadens, the conditions under which the le is a true lease," charges Fra Griesinger of Lincoln Electric C Cleveland (for examples, see STE Sept. 19, p. 71).

On the depreciation issue, lis to Cherry-Burrell's F. A. Lackn "Bulletin 35 has completely n lected the recent changes in all able methods of depreciation regular sales) and is sticking the straight-line system or equivalent. Apparently, the hand knoweth not what the ri hand doeth."

On the issue of clarity, hear L. Salinger, of Walter E. He & Co., an industrial and commer financing firm: "The rulings to give positive guides to what permissible in a lease, and t introduce some new concepti which are rather confusing."

Charges Machinery & Al Products Institute in a seven-p critique: "One of the fundame defects is the consistently nega approach which focuses almost tirely on the possibilities of ab of leasing arrangements."

Negative—Because of those fects, most students of the s ject believe that leasing will cline until the Treasury dep ment comes up with new ruli or the courts adjudicate. A from tax uncertainties, the ruli could play hob with the acco ing procedures of lessors and sees.

Of couse, many leasing plans still considered true leases. A f that has traditionally leased never sold its equipment appe on firm ground. The leasing c panies seem in good shape. In g eral, those leasing plans wit tenure closely paralleling the " ful life" assigned to the equipm in IRS's Bulletin F get a nod approval from the service.

Exception — Kearney & Tre Corp., Milwaukee, is one of firms that believes Bulletin 35 mean no curtailment in its lea program. "It is not, and has n been, our intention to sponso device whereby a shift or de ment of tax liability not cont plated by law would be achiev says the corporation's presid Francis J. Trecker. "We have deavored to set up a true l contract to meet the bona situations where solid business

ns make leasing preferable to rchasing."

K & T estimates that about 6 r cent of its business volume for 55 is coming from rentals, com- red with some 4 per cent in 1954. e 1956 leasing volume should hit o 8 per cent. Clark Equipment ., Buchanan, Mich., another firm at sees no effect on its activities m Bulletin 35, says about 20 r cent of its volume results from ses. That ratio may grow to 25 r cent in 1956.

Agreement—Whatever their po- ion on Bulletin 35, most metal- rking executives whose compa- s lease agree with J. H. Lewis Lewis-Shepard Products Inc.: easing has probably won a per- nent—although minor—place in r industrial marketing system." Those dissatisfied with Bulletin believe it's possible to get IRS modify its position before too ch damage is done (see STEEL's torial, page 45). In the interim, ny experts advise: Get advance arance with IRS on individual sing deals. That usually takes e to six months.

Extra copies of this article are available quantities from one to three until supply exhausted. Write Editorial Service, EL, Penton Bldg., Cleveland 13, O.

Businessman's Atom

Five-day conference will stress ways to put nuclear energy to work in industry

DOLLARS - AND - CENTS atomic business will be the attraction for visitors to the Nuclear Engineering and Science Congress at Cleveland, Dec. 12-16. They'll also see an International Atomic Exposition.

Theme — A two-day industrial program will be built around the theme that you don't need the capital, equipment or massed brains of an AEC to put the atom to work in your business. Three sample talks from the Dec. 15 program: "Getting Into the Nuclear Field—A Report to the Board;" "Setting the Budget for Your Small Hot Atomic Laboratory;" "Atomic Energy and Its Place in Your Business."

The scientific program covers the full five days. Among the 300 technical papers are a number on workaday aspects of the atom: Uses for nuclear energy in typical industrial research projects, economics of small nuclear power packages and medical, legal and insurance problems.

Two Sides—Exhibitors have been urged to remember the dual nature of the audience; there will be atomic ABC's, as well as technical displays by the 160 exhibitors from the U. S. and abroad.

The conference is being co-ordinated by the Engineers Joint Council, New York. The exposition is sponsored by the American Institute of Chemical Engineers. Registration is through the Cleveland Engineering Society, 2136 E. 19th St., Cleveland 15, O.

Porter Acquires Disston

The H. K. Porter Company Inc., Pittsburgh, has acquired Henry Disston & Sons Inc., Philadelphia.

T. M. Evans, president of the Porter company, announced that Disston, maker of saws, industrial tools and tool steel, will operate as the Henry Disston Division.

In another move, Mr. Evans disclosed that the firm of Carlson & Sullivan Inc., Monrovia, Calif., also will merge with Porter. The company makes steel rules and measures. It will be a part of the new division.

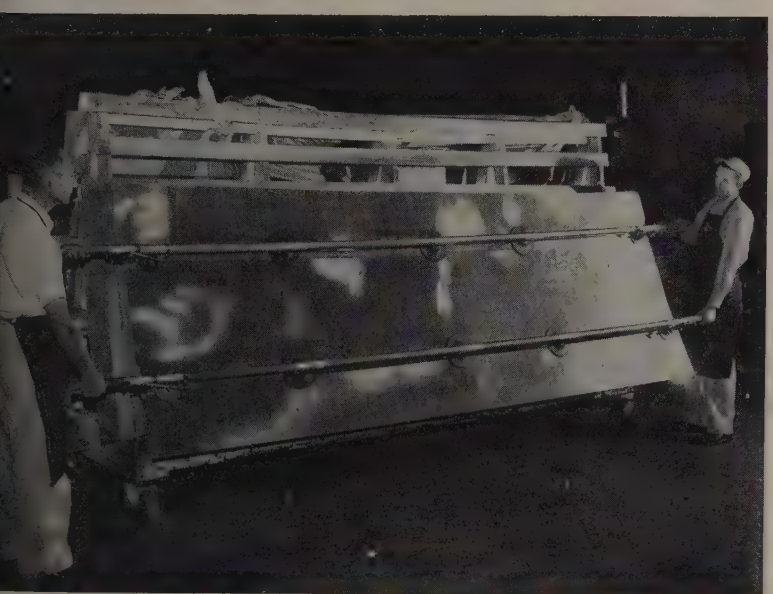
Disston formerly was in competition with another Porter division, Vulcan Crucible Steel Co., Aliquippa, Pa., which also manufactures tools and special tool steels.

Lawrence L. Garber, a Porter vice president, has been named general manager of the division. He recently has been general manager of Porters' Alloy Metal Wire Division, Prospect Park, Pa. Emmett Mann, present sales manager at Alloy, will succeed Mr. Garber.

John Thompson, Disston's president, is retiring. Jacob S. Disston, board chairman, and Horace Disston, former chairman, probably will serve in a consulting capacity.

Installs Annealing Furnaces

Six new elevator-type electric annealing furnaces have been placed in operation at Allis-Chalmers Mfg. Co.'s Pittsburgh Works for heat-treating semiprocessed transformer core steel. Each of the 15-ton, 360-kw furnaces heats the steel for several hours around 2000°F in a controlled atmosphere of hydrogen.



cuum Lifts Protect Aircraft Skin from Damage

neral Dynamics Corp.'s Convair Division (Fort Worth, Tex.) moves unwieldy minum sheet stock by static vacuum bars. Suction cups attached to aluminum rs are applied to the metal sheet with hand pressure. Convair-Fort Worth ns other vacuum applications to protect metals from nicks and scratches

Federal agencies team up on $460-million kitty to see that . . .

Small Firms Get Fair Share

A FAIR SHARE of government business for small firms—that's the aim of a new joint program of the Small Business Administration and General Services Administration, which buys about $460 million worth of goods and services annually.

Being developed are procedures for joint screening of procurement to be earmarked for exclusive competitive award to small business. As requirements are set aside, the Business Service Centers in GSA's ten regional offices and SBA's 14 regional and 25 branch offices will be notified.

The joint program began a trial run at GSA's New York office in September. So far, procurements amounting to $855,000 have been reserved for award by competitive bidding to small business concerns.

Focus on T-H, Steel

No changes in the Taft-Hartley Act will be made by the next Congress, predicts James P. Mitchell, secretary of Labor. But he will try to get action on five non-T.H. administration bills. Among them: 1. Required overtime pay to workers under federal contract if their workweek goes over 40 hours in five 8-hour days. 2. Federal financial and technical help to states for developing job safety programs.

Steel shortage is getting increasing attention in Washington. BDSA officials say production directives for priority materials are currently running two and one-half times over the weekly average of the last six months. The rise is expected to continue into next year.

Flood Insurance Plan

Disaster insurance is sure to get a workout when Congress reconvenes. The latest plan, drafted by Rep. Thomas J. Dodd (Dem., Conn.), would provide three basic types:

1. Insurance providing cash i
imbursement for those who can
ford that kind of protection.

2. Reimbursement in the form
a long-term loan without intere
made without regard to the cre
rating of the insured.

3. A combination of the first tw

Here and There

Federal officials are keeping
wary watch on the housing situ
tion. They wonder if they tigh
ened the credit lid a little too tig
ly. The Veterans Administrati
reports requests for appraisal
new homes for GI loans dropp
in October for the second straig
month. Already there are so
indications of more credit
home building. The VA rep
should add fuel to the fire. A S
ate subcommittee will open he
ings on housing credit cu
Nov. 28.

The Atomic Energy Commissi
passed out 97 access permits
October, the largest number in a
one month since the permit p
gram began. That brings to 4
the number of permit hold
eligible for access to restrict
data, subject to security clearan

E. C. Kreutzberg Dies

EDGAR C. KREUTZBERG, STEEL's Washington editor, died Nov. 13 after a long illness.

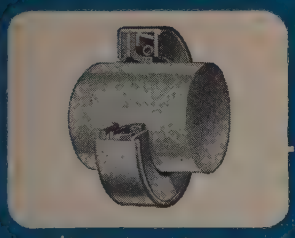
He had served this publication 45 years and had written "Windows of Washington" and other Capitol news since 1943.

He was born in Milwaukee in 1887, and shortly thereafter his parents moved to Trenton, N. J., where he received his primary schooling. He attended Princeton University, and in 1910 he joined Penton Publishing Co., which is the publisher of STEEL.

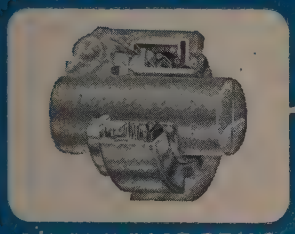
Mr. Kreutzberg transferred
the New York office in 1911 wh
he served in both editorial a
business capacities for a time.
returned to Cleveland in 1934
engineering editor and was
pointed editor in 1937.

In 1943 he was named chief
Penton's Washington editorial
reau, representing *Foundry, M
chine Design, New Equipment
gest* and *Automation,* as well
this magazine.

FOR PERFORMANCE PROTECTION

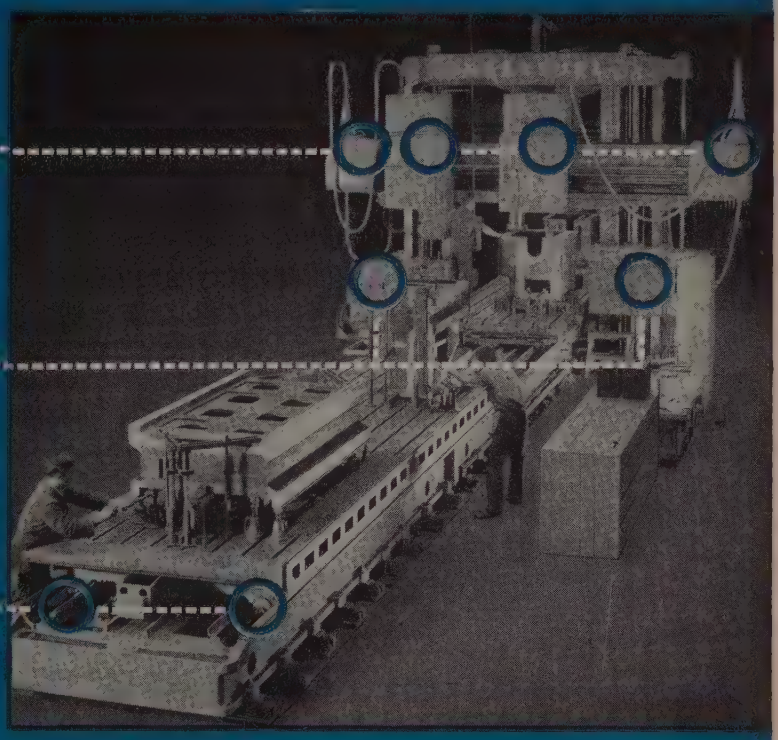


C/R SHAFT SEALS



C/R END FACE SEALS

C/R SIRVENE WAY WIPERS



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C/R SHAFT SEALS deliver outstanding sealing performance and service life on medium speed shafts, gear cases and drive mechanisms. They seal lubricants, exclude chips, coolants, abrasives—and require minimum radial and axial space.

C/R END FACE SEALS are lapped to .000034 in. to provide absolute lubricant retention and exclude chips, coolants and all foreign materials on high speed spindles, shafts and drives under the most critical service. Normally they operate throughout the entire life of the machine tool.

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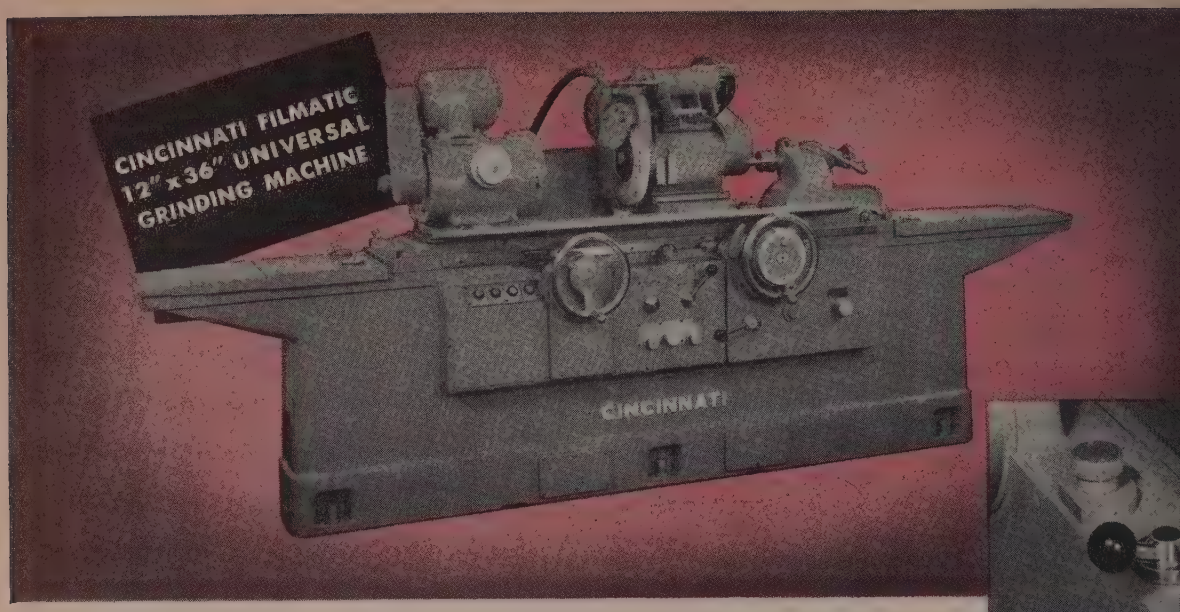

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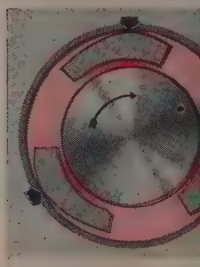

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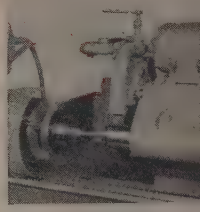

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the way to final size.

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GE's Hollomon: Scientist-Salesman

TOP-NOTCH metallurgists are scarce and will become more so. It's highly unlikely that John Herbert Hollomon, 36-year-old manager of General Electric's Metallurgy & Ceramics Research Department will be looking for a different job. If he ever does, he could be a crack candidate for a sales position.

That is the consensus of the 100 young scientists and technicians who work under his direction in GE's new $5-million laboratory. They know because Dr. Hollomon has sold them on the job they are doing and has instilled much of his own enthusiasm in them.

Telescoping—Dr. Hollomon (his bosses call him Herb) is a practical scientist. His aim at the metals and ceramics laboratory is to shorten the gap between the laboratory and the production line.

The new metals and ceramics building is designed for that purpose. Here are found both research facilities and a modern workshop which permits the extension of experimental work to commercial applications. GE scientists find out if a 1-gram sample, made in a test tube, still looks promising in 100-lb or even larger quantities. GE engineers can see, rather than imagine, how a new alloy might perform in their designs.

Doctors in Overalls — Here Ph.Ds happily sweat and toil in overalls to make sure that theory and practice coincide.

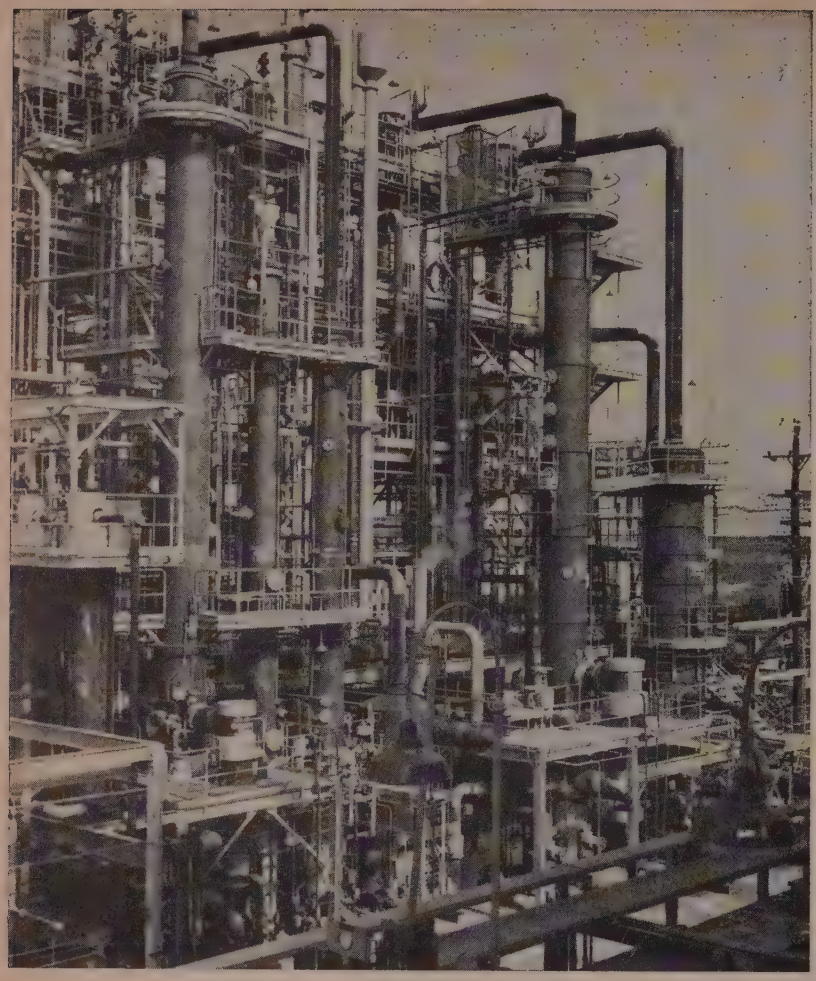
Dr. Hollomon states the objectives of his organization this way:

1. To ascertain and analyze the areas of most critical need for materials and processes.
2. To develop processes for new businesses.
3. To develop materials to improve products.
4. To study materials and obtain a better understanding of their properties and processing.
5. To operate pilot plants and obtain economic data.

In First Ten—Herb Hollomon has a large collection of kudos about which you have to ask his associates. He was picked as one of America's ten outstanding young men by the national Junior Chamber of Commerce in 1954. He also was cited by *Fortune* as one of America's ten leading young scientists. The Army awarded him the Legion of Merit for his work during World War II as chief of physical metallurgy at the Watertown arsenal. As author of some 40 papers in journals of physics and metallurgy as well as a textbook, *Ferrous Metallurgical Design,* he received a number of awards from scientific societies.

His bachelor and doctor of science degrees are from Massachusetts Institute of Technology, and before the war he served on the faculty at Harvard.

His big love is finding better materials and processes for industry.



Du Pont's Victoria, Tex., polychemical refining unit

Chemical Industry Expands

CHEMICAL manufacturers will spend some $1.1 billion on expansion this year.

More than $500 million of that is going into steel construction and equipment, according to the Securities & Exchange Commission. On the basis of the SEC estimate, expenditures will be off a shade from last year and substantially down from the $1.6 billion peak in 1953.

Time Out—The lag is regarded as a breather. Du Pont, for example, expects to increase expansion expenditures next year 15 to 20 per cent, or about $140 million. Its previous top was $135.5 million in 1951, a figure almost equaled by the $135.1 million outlay in 1953.

Five-Year Output — The Manufacturing Chemists' Association, Washington, reports that since World War II, the chemical industry has been among the top three manufacturing industries in expenditures for new construction.

The President's Materials Policy Commission estimated that between 1950 and 1955 projected construction of petrochemical facilities alone would require 784,000 tons of steel, 45,200 tons of ferroalloys, 24,600 tons of cast iron and 9440 tons of nonferrous metals.

King-Sized Business—The chemical and allied products industry is the fourth largest manufacturing group in the country in terms total assets ($15.8 billion) and least the fifth largest in terms annual sales. MCA reports t this year's sales will run close a record $23 billion, 17.6 per c up from 1954.

Industry Definition—These s figures take into account b "chemical and allied products" the group is defined by the Bur of Census.

This complex industry sp into three groups: 1. Basic ch icals, such as acids, alkalies, s and tonnage organic chemicals. Chemical products to be used further manufacturing, such synthetic fibers, plastics, solve colors and pigments. 3. Finis chemical products like drugs, c metics, paints, detergents and tilizers.

Future Growth — MCA pred that, in the next decade, the dustry will grow three times fa er than the all-industry aver expansion rate. By 1975, sales industrial chemicals alone pr ably will be $25 billion. In 19 the total was $5.5 billion.

Trend Indicator—The industr purchases of raw materials tremendous. In 1953, according Stanford Research Institute, t were $2.9 billion. Of this amou $188.6 million went for met $418.6 million for coal, coke coal tars and $71.7 million for tallic minerals. The largest sin item was $953.4 million for and oils.

Navy Lets New Contracts

Rounding out its shipbuild program for fiscal 1955, the Na has awarded a contract for th oceangoing minesweepers to Pet son Builders Inc., a Wiscon shipyard. The contract price just under $6 million.

The Navy is starting to let c tracts for fiscal 1956. Bath I Works will build the first of frigates, three of which will equipped for guided missi Pentagon reports indicate tha further expansion of the gui missile ship program is plann A total of nine such ships are the list handed to budget offic as a basis for the fiscal 19 budget request.

ltivation of growth markets pays dividends as . . .

owder Metals Catch On

WDER metal producers have automobile industry to thank a record year. More than 29,- tons of their 56,000-ton out- will go for auto parts. Last r, shipments were only 36,000 s.

Even though the auto take may off next year, powder people betting on continued gains. The cess of their product and mar- development programs lends stance to their optimism.

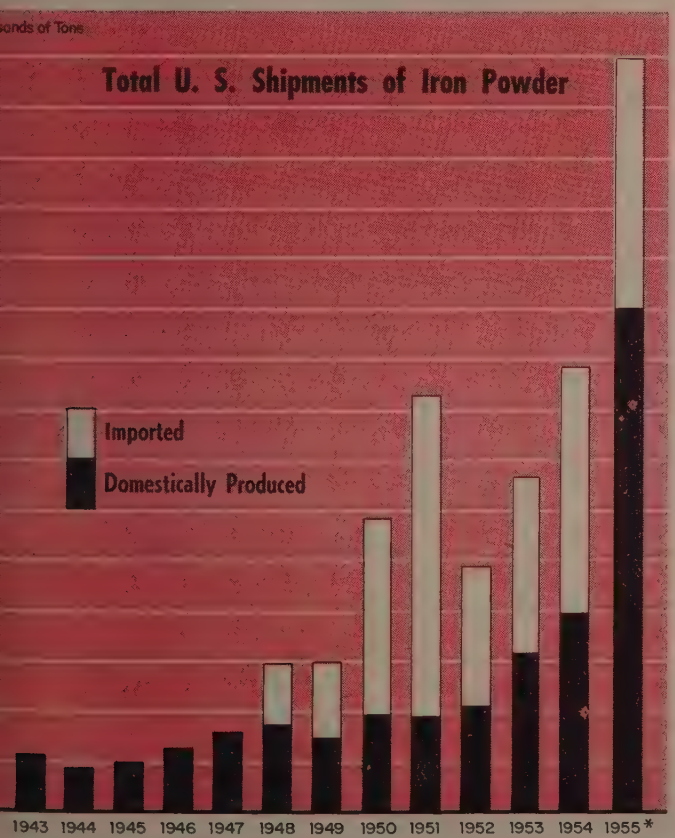
Markets—Powder filters for gas- e were popularized in the auto ustry. Now, market emphasis switched to jet aircraft fuel rs, and to a host of new appli- ons in hydraulic systems (the terial does a second-to-none job keeping delicate servo valves in operation). Applications in business machines and hardware are growing fast. Further gains are expected from iron powder cores for electronic parts.

Breakdown—About 25 domestic producers supply most of the powder used by 100 principal fabricators. Iron powder makers made the most startling gains of the year. From 1949 through 1954, imported iron powder held the lion's share of the American market. This year, domestic producers will supply more than two-thirds of the iron powder consumed—about 20,000 tons valued at better than $4 million.

Copper, lead and alloy powders are making substantial gains. Copper-alloy powder shipments almost doubled from 1954 to 1955, jumping from 4650 to 8200 tons. Bearings and parts take 79 per cent of the copper powder output, friction materials 7 per cent, graphite metal brushes 5 per cent and miscellaneous uses the remaining 9. Lead powder shipments for the year are projected at 3500 tons, highest since 1945 when splatter-type bullets plumped demand.

Trends—To help stimulate new markets, powder producers strive to hold their cost down. At the same time, fabricating tools are improving rapidly. The results: New applications are opening up fast, not only in mass-produced complex parts where powder metallurgy is the ideal solution for production problems but also in special machinery, where runs can be relatively short. Recent gains in the textile equipment market afford a good example. One important equipment trend is toward multiple-motion presses that can churn out parts to close tolerance, but which can still be changed over at minimum expense.

The powder metallurgy outlook is bright. Nuclear power reactor parts and other atomic energy fields promise substantial new markets. Zirconium, beryllium and other alloy powders will play an important part in solving their special problems.


Total U. S. Shipments of Iron Powder
Imported
Domestically Produced
1943 1944 1945 1946 1947 1948 1949 1950 1951 1952 1953 1954 1955*

nated
e: Metal Powder Association

New Boat Breaks Tradition

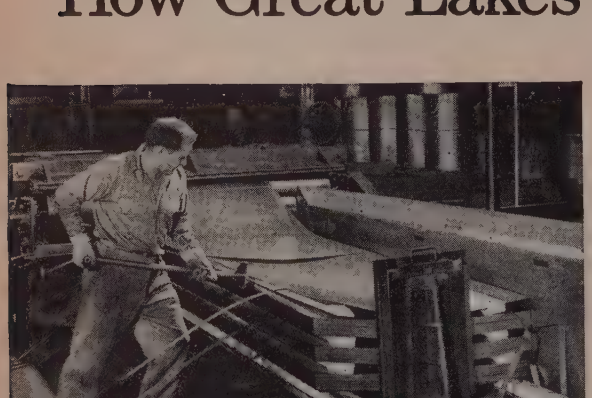
A 90-ft twin-screw towboat the Dravo Corp. is building in its Wilmington, Del., shipyard will start push-towing of barges on east coast waterways next year.

On the Ohio and the Mississippi, towboats have pushed barges for over 100 years. But, traditionally, barges are towed behind or alongside the power vessel on east coast waterways.

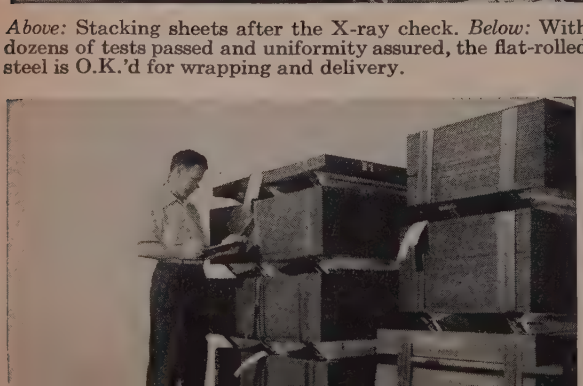
The new towboat combines the features of river towboats with those of harbor tugs. It will push two 20,000-barrel tank barges along a 90-mile route from Piney Point, Md., to Washington.

Steuart Transportation Co., a newly formed subsidiary of Steuart Petroleum Co., Washington, will use the boat to move petroleum from its tank farm to distribution terminals.

How Great Lakes Steel *X-rays* quality



Above: Stacking sheets after the X-ray check. *Below:* With dozens of tests passed and uniformity assured, the flat-rolled steel is O.K.'d for wrapping and delivery.



Why do sheets from Great Lakes Steel consisten meet customers' specifications? The X-ray mach is one of the answers. Here an indicator (sho above) signals the thickness of steel sheets as th pass on a conveyor belt. Any sheet failing to m the established standard is immediately ejected.

Throughout the Great Lakes mills, mode machines and experienced men work together maintain the consistent quality of our flat-rol products. Our service includes close contact w customers by Great Lakes representatives, m who are concerned not only with steel product but also with the performance of our steel in plants of customers.

The next time you have a problem in steel, give a call. You will find that both quality and serv are *consistent* at Great Lakes Steel.

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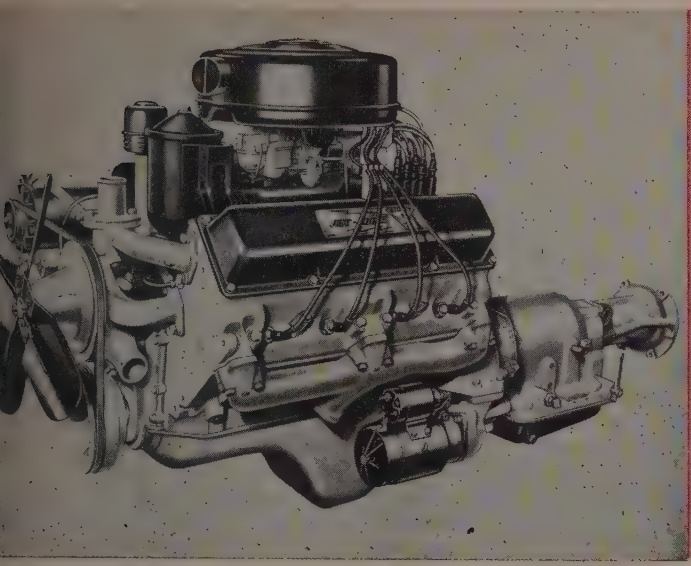

What's Coming in Engines?

Fuel injection?

Diecast blocks?

500 horsepower?

Higher compression ratios?

Bigger displacements?

ciprocating units will hit 500 hp in . . .

volution in Engines

YOU'RE one of those people rried about where the horse- ver race is going to end, pity poor engine designer whose ng depends on the answer to same question.

Step Up — Average maximum rsepower figures for the various kes in the industry put the 1953 rage at 133 hp. In 1954, it nped to 160; in 1955, to 200; l this year it will be about 240. ntrast this with the 235 hp ich netted Chrysler the 1954 rsepower crown, and you can see scope of the uppage. Cadillac tors announced 230 hp in 1954, l just two years later is offer- 305 hp in its power-package s.

The proportional gains are quite bstantial enough to be conjured h in the various dynamometer s around town, as well as in the agencies. Where the present rate increase (30 to 40 hp annually) eading is a question vital to the omakers in an extremely unaca- nic way.

Pressure—Two factors heighten the problem. The first is the imminence of the turbine; its coming now seems largely a matter of competitive pressure. Major fabrication bugbears are melting rapidly, with the latest word on the subject indicating that Ford is pretty well settled on shell-molded blades of a ferritic alloy. Chrysler has made "extremely satisfactory progress" in the last year. And General Motors sees no insurmountable barriers. Studebaker-Packard also seems ready, and the first company to break will find the rest right on its heels, though all will continue to refine their designs.

The second factor important in the future of reciprocating engines is the fact that most automakers are presently running out of engine. One engine introduced in 1955 was facelifted during the design period and introduced with the knowledge that it was only about 50 hp under its intended maximum. Engines already on the market have only a year or two to go before really major changes will be necessary.

Consolation—Comforting is the fact that reciprocating engines won't be dropped overnight when the turbine arrives, which indicates that expenditures in research and manufacturing will continue to pay off. All of which gets back to the original question of where the horsepower race is going to end.

Best guesses right now are that the horsepower race will end at 500 hp. There are plenty of factors that indicate this ceiling, but the major one is the limit of tire adhesion to the pavement during acceleration. With 500 hp advertised, or a net of about 375 hp to the rear wheels, it is possible to spin the wheels on dry pavement at any speed up to 60 mph, and that's the basis one automaker is using in laying out his new engine.

Considerations — Tire adhesion could be improved, of course, but there are other reasons for putting the limit there. A major one is the space available between the front wheels for the engine. Allison produced an engine rated at 1710 hp for aircraft, but it would pretty well fill the passenger space of a conventional car. Assuming

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the space to be fixed, 500 hp is about tops for an engine to fill the cavity.

Such an engine, however, will be quite a frameful. Displacement of one engine now on the drawing boards will be adjustable up to 450 cu in., and most engineers figure that will be about the maximum for the V-8 type. If that seems incredibly big to you in terms of 300 cu in. being a big engine until recently, Lincoln this year provides 368 cu in. for explosions to dissipate themselves.

Meaning—Making an engine that big does have plenty of implications for metalworking men. Now getting under way is a round of new tooling to increase engine displacements. And those tooling demands will rise still more during the next two years. Machine tool builders particularly will find demand for new equipment to replace tools usable only on smaller blocks, heads, etc. While some machines are adaptable to larger parts, fixed spindles and work clearance items must be discarded as automakers continue to up their horsepower.

Included in the same package will be modernization of engine plants, some of which were the latest thing only two or three years ago, to take advantage of further developments in automation. And one major automaker presently building separate engines for each of three divisions is considering a new engine plant to build one basic engine for all three, with the objective of greater volume and interchangeability of parts. Important changes for easier manufacture also are in the offing as retooling takes place.

Aluminum Block?—Another factor of fundamental importance to metalworking men is the possibility of die-cast aluminum engine blocks. One factor, of course, is the weight consideration in engines of the size contemplated. Already noseheavy to an embarrassing degree, the car of tomorrow could have the directional persistence of an arrow with that mass of weight in the front.

But while handling engineers drool over die-cast blocks from the weight distribution standpoint, the manufacturing people contemplate fabrication short cuts possible through the technique. Examples of machining reductions up to ten times in some transmission parts through diecasting quite naturally lead them to consider ever more closely the possibility of similar economies in vast engine machining setups of today. Even with the contemplated wet sleeve design, diecasters and aluminum people working with the automakers figure the savings would be considerable.

Timetable—Best guesses now are that die-cast aluminum engines will begin to appear on the road within the next two to four years, following the immediate round of displacement increases. The impact on aluminum consumption will undoubtedly be considerable, and automaker expansion in the die-casting field could well have greater impact than on the machine tool business.

Plenty of other things will have to be done to get the expected 500 hp from the reciprocating engine of tomorrow, however. Much touted fuel injection must compete with a four-barreled carburetor that costs only about $15 today. Offering advantages in better mixture control and fuel distribution, the cost barrier still looms all important in whether it will be adopted.

Injection — Research presently centered on injection into the take manifold rather than into cylinder holds promise that cost barrier can be overcome. F ly narrow torque characteristics sociated with the Hilborne sys also are reportedly being mounted, and it seems likely the system will become opti equipment within the next y Packard looks like a good be launch it as another indu "first."

Its role in the move to 500 will be to lower octane requ ments (about 5 to 10 numbers) creasing power perhaps 20 per and economy about 10 per c Others may well be forced to c it to overcome deficiencies in displacement race, however, ar will gradually creep down standard equipment roster.

Evolution—Other component the car will require substa modification to handle the creased engine output, particu ly in the drive train. And tr missions will be given still r impressive performance chara istics, so that the net effect 0 to 60 mph times will be s thing to behold.

Already a step in that direc is the new three-speed auto transmission in the works Chrysler's Kokomo, Ind., now abuilding.

Perhaps the most amusing t in the whole picture, believe i not, is a general belief that h power is to be de-emphasize the years ahead. Some cite Continental as indicative of trend and report that torque i the upswing as a performance for the layman, just as it has to the engineer for some t Oldsmobile announces the "T- this year in a reference to to Lincoln makes no secret of a remarkable 401 foot-pound ra on its engine for 1956; and has continued the "trigger-tor motif started last year with 1955 models.

But whether horsepower is emphasized, it's a safe bet th will continue to increase at the it has in the past for at least next four or five years. At present rate of increase, that checks out at 500 hp. Now al need are traffic lights with g yellow and a checkered flag.

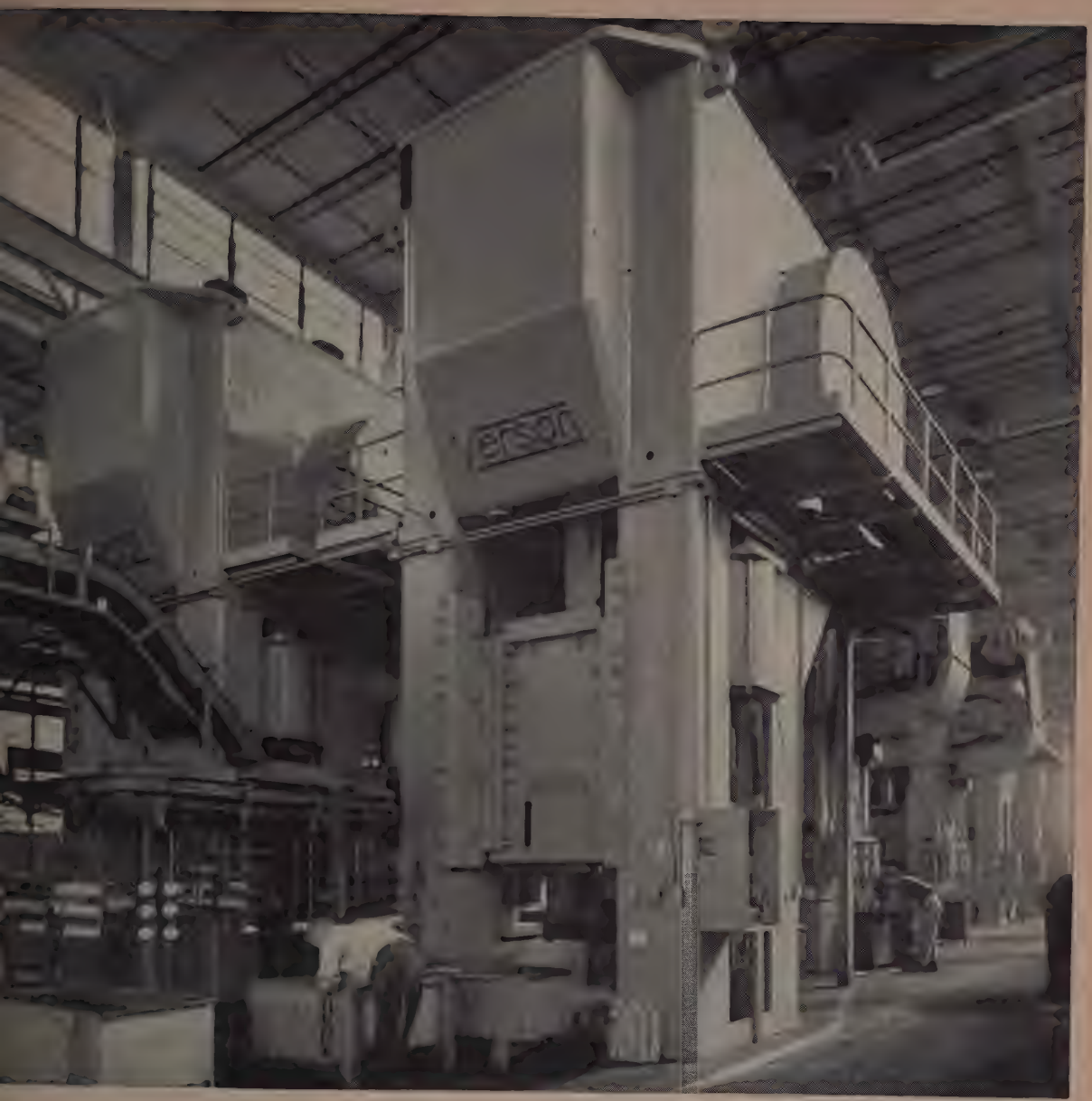
U. S. Auto Output

Passenger Only

	1955	1954
January	659,719	456,765
February ...	675,769	443,257
March	794,188	526,076
April	754,007	533,470
May	724,891	494,250
June	649,372	504,811
July	659,979	441,451
August	614,392	436,650
September ..	461,592	285,860
October	517,696†	236,635
November ..	.....	508,466
December ..	.....	641,971
Total	.....	5,518,662

Week Ended	1955	1954
Oct. 15	101,581	44,882
Oct. 22	137,425	45,649
Oct. 29	158,430	68,649
Nov. 5	162,278	92,766
Nov. 12	181,400†	116,285
Nov. 19	184,000*	133,917

†Preliminary *Estimated by STEEL
Source: *Ward's Automotive Reports*



-Verson-

ECCENTRIC PRESSES head the line at Heintz Manufacturing Company

● The two Verson Eccentric Presses illustrated above are each rated at 1500 tons with 4500 tons drive capacity. The presses are a key part of the cold extrusion lines at Heintz Manufacturing Company, Philadelphia, said by many to be "the birthplace of cold extrusion of steel in America." Both presses are specially designed with fast operating speeds to fit the production process.

Like all Verson Eccentric Presses, these represent the ultimate in mechanical press design. They provide power, strength, resistance to deflection, accuracy and efficiency unmatched by any other mechanical presses. This design coupled with Verson production know how means that when you select a Verson press, you get more than just a press. You get a production tool, tailored to your requirements as an integrated part of your production process.

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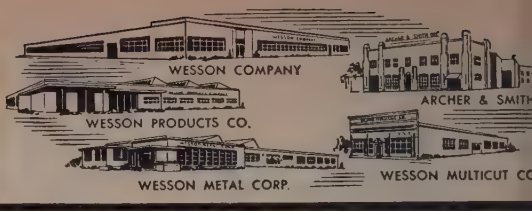
carbide NEWS

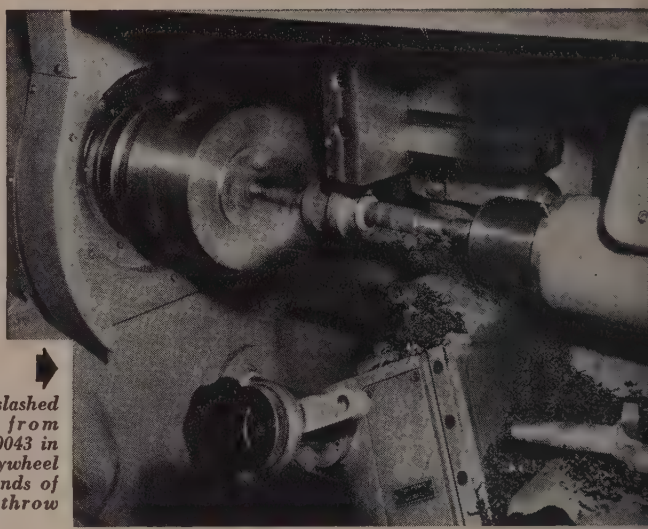


Grade 26 Cuts Tool Costs 88%

New wide range grade and holder boost pieces/grind from 85 to 800

A reduction from approximately four cents to less than ½ cent per piece in tool cost has been achieved in the machining of single-throw Arma Steel crankshafts by a midwestern machine company. These savings were obtained despite an increase in blade cost of 41% over the style previously used.

The savings were achieved in two steps. The first revealed that Wessonmetal Grade 26 would out-perform all other grades by an average of 50 pieces per cutting edge. The next step was to adopt a Wesson Multicut holder. This helped to increase tool life to 200 pieces per cutting edge. With four edges per insert, life is 800 pieces per grind, as against the original 85. Part of the overall increase is due of course to the rigid construction and support provided by the new holders.



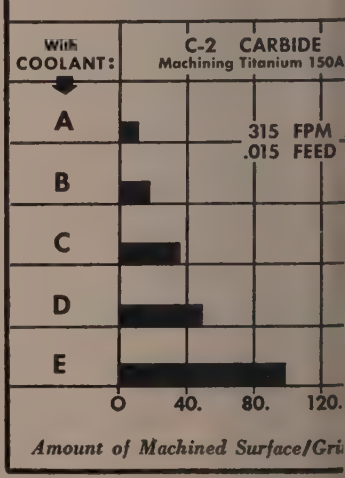
26 Carbide slashed tool cost from $0.038 to $0.0043 in machining flywheel and pulley ends of this single throw crankshaft.

Operations consist of rough and finish turning of the flywheel and pulley ends of the 220 Brinell steel crankshaft. Machining is being done dry on a 20 hp New Britain tracer lathe at 1210 rpm and .014" feed. Depth of cut averages ¼ to ⅜-inch.

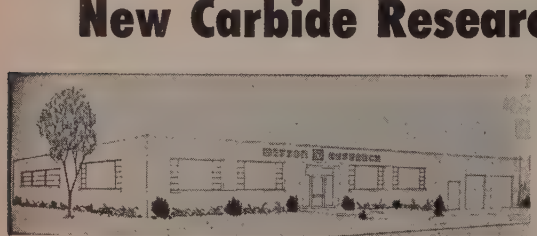
In achieving the savings, no changes were made in speeds, feeds or depths of cut.

Tool Hints...

The cost-cutting story told abo re-emphasizes the necessity of stud ing ALL the factors contributi to tool performance if maximu economies are to be obtained. this case, the answers lay in (a) t carbide metal and (b) the to holder. Sometimes it may be t coolant which will provide a maj saving. In the chart below, for i stance, are shown relative lives the same tool material at the sa speeds and feeds using five differe types of coolant in the machini of Titanium 150A! A C-2 grade carbide was used and feed was .01 at 315 ft. per minute.



New Carbide Research Center



New concepts in carbide boring and milling cutter designs may result from new research programs now under way at Wesson. Included are milling cutters utilizing "throwaway" carbide blades.

To house Wesson's expanded product development and tool application research facilities and staff, a new one-story structure has been completed adjacent to Wesson's Detroit plant.

The new research division will supplement the basic metals research carried on in Lexington, Kentucky at the new metals plant of the Wesson Metal Corporation, now producing all Wessonmetal carbides.

The new research division is under W. B. Bader, Vice President. It is being completely equipped for fabrication as well as testing of new tool designs. Lathes, milling machines, grinders, etc., are included in the equipment.

tools Wesson
carbide Wessonmetal

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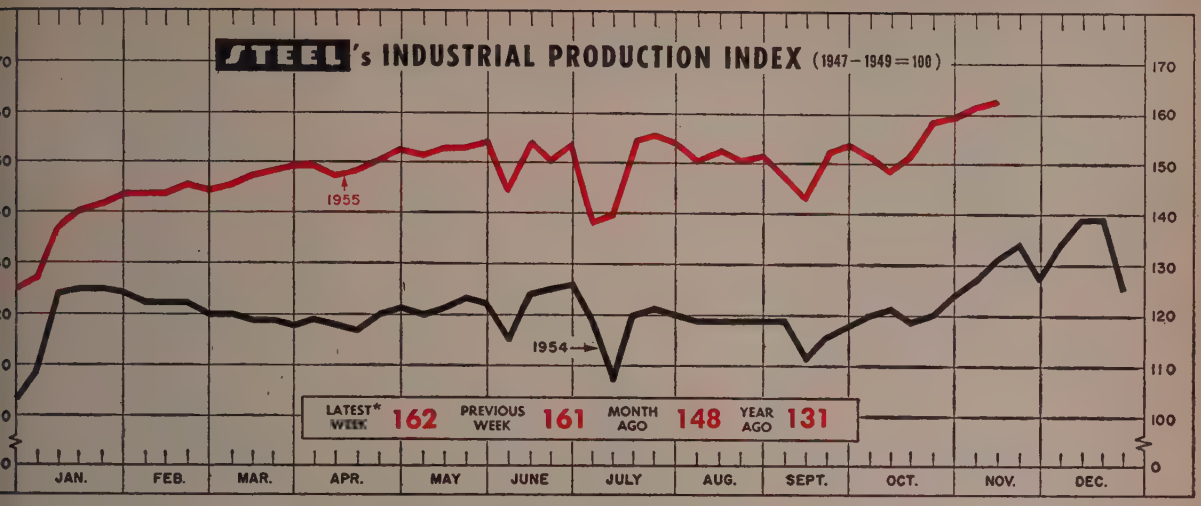
Detroit 20, Michigan



eek ended Nov. 12. Based upon and weighted as follows: Steel Output, 35%; Electric Power Output, 32%; Freight Car Loadings, 22%; and Auto Assemblies, 11%

Sales Pace Inventories in Last Quarter

USINESS INVENTORIES are ading upward.

It's a good sign generally, not e back in 1953 when top-heavy ventories were a big factor in rting the 1954 decline.

Contrast—There are important ferences in the 1955 picture: 1. les are pushing ahead strongly, tpacing the inventory build-up many cases. A hearty indica-n they will continue on the up-rd slant for months to come is swelling tide of new orders.

Looking back at the 1953-54 riod when total inventories mped $3 to 4 billion, Labor de-rtment reports show that sales re dropping about the same nount. New orders dropped even ore.

Christmas Rush — Inventories ually rise toward the end of the ar. Trade manufacturers are ocking up for the seasonal push. s likely there will be some drop ter January.

The big change is in manufac-ring. Sales are above $27 billion month. At this time in 1954 and 53, monthly sales were under 5 billion.

New orders are running at over 8 billion a month, compared with 5 billion in 1954 (when the busi-ss pickup began) and $22 billion onthly in 1953.

Manufacturers' inventories, which are about $45 billion now, were $44 billion in 1954. In 1953, inventories were high at $46.5 billion.

An inventory rise at this time shows confidence of buyers and manufacturers alike. It's a good indication of the over-all healthy state of business.

In Steel—An example of the inventory situation is steel. In September (latest figures), steelmakers added 303,977 net tons to their stocks. That's about one day's usage. A year ago in September, they were withdrawing from inventory—to the tune of 1.1 million tons.

Employment is going along with rising inventories, a sign that

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	2,384[1]	2,404	1,892
Electric Power Distributed (million kw-hr)	10,760[1]	10,853	9,357
Bitum. Coal Output (1000 tons)	10,100	9,760	8,597
Petroleum Production (daily avg—1000 bbl)	6,770[1]	6,777	6,191
Construction Volume (*ENR*—millions)	$267.9	$394.0	$371.5
Auto, Truck Output, U. S., Canada (*Ward's*)	215,609[1]	199,950	141,606
TRADE			
Freight Car Loadings (1000 cars)	820[1]	809	686
Business Failures (Dun & Bradstreet, no.)	226[1]	237	204
Currency in Circulation (millions)[3]	$30,657	$30,528	$30,278
Dept. Store Sales (changes from year ago)[3]	+1%	+8%	+4%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$18,272	$22,498	$19,959
Federal Gross Debt (billions)	$279,751	$279,826	$278,721
Bond Volume, NYSE (millions)	$15,931	$17,019	$25,004
Stocks Sales, NYSE (thousands of shares)	9,351	9,695	16,157
Loans and Investments (billions)[4]	$85,623	$85,571	$84,932
U. S. Govt. Obligations Held (billions)[4]	$30,559	$30,922	$37,358
PRICES			
STEEL's Finished Steel Price Index[5]	208.90	208.90	194.53
STEEL's Nonferrous Metal Price Index[6]	264.0	264.4	217.2
All Commodities[7]	111.0	111.1	109.7
Commodities Other than Farm & Foods[7]	118.7	118.7	114.5

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1955, 2,413,278; 1954, 2,384,549. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-1939=100. [6]1936-1939=100. [7]Bureau of Labor Statistics Index, 1947-1949=100

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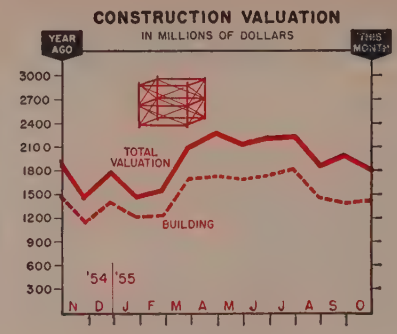
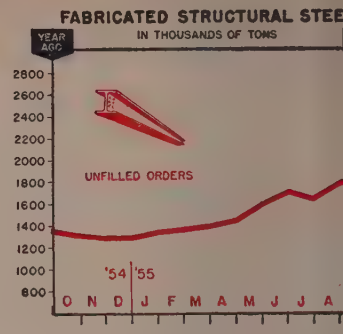
THE BUSINESS TREND





	37 States Total		Building	
	1955	1954	1955	1954
Jan.	1,504.5	1,151.9	1,255.1	935.6
Feb.	1,581.1	1,221.3	1,278.6	977.5
Mar.	2,134.8	1,527.5	1,748.6	1,199.8
Apr.	2,322.1	1,691.9	1,776.1	1,401.6
May	2,185.1	1,925.3	1,737.1	1,497.6
June	2,255.2	1,733.3	1,793.7	1,376.7
July	2,271.5	1,836.9	1,851.6	1,386.9
Aug.	1,894.8	1,572.9	1,516.9	1,243.3
Sept.	2,034.9	1,816.2	1,442.2	1,424.2
Oct.	1,862.7	1,965.3	1,474.8	1,522.8
Nov.	.....	1,498.9	.....	1,199.8
Dec.	.....	1,828.8	.....	1,463.0
Total	.....	19,770.2	.....	15,628.8

F. W. Dodge Corp.

	Shipments		Backlogs	
	1955	1954	1955	19
Jan.	225.8	245.6	1,346	1,6
Feb.	213.4	253.1	1,360	1,6
Mar.	227.8	285.4	1,392	1,6
Apr.	239.7	293.5	1,444	1,5
May	223.2	253.9	1,592	1,4
June	282.3	290.3	1,706	1,3
July	219.4	265.2	1,639	1,4
Aug.	266.7	272.5	1,776	1,2
Sept.	289.1	265.4	1,854	1,3
Oct.	.....	258.4	....	1,2
Nov.	.....	228.7	....	1,2
Dec.	.....	223.5	....	1,2
Total	.....	3,135.5		

American Institute of Steel Construct

Charts copyrighted, 1955, STEEL

manufacturers expect the next quarter to be good.

Steel industry employment increased in September for the ninth straight month, reports the American Iron & Steel Institute, New York. The September total was estimated at 680,200, compared with 679,900 in August and 597,400 in September a year ago.

Iron and steel wages for September totaled $302.8 million. That averages out at $2.60 per hour for each worker. Wages and employment should stay at least as high, possibly higher with the increasing demand for steel.

Employment Keeps Rolling . . .

Total U. S. employment rose to a record 65.2 million in October, say the Commerce and Labor departments. That's 400,000 higher than September and a good 3 million more than a year ago.

Unemployment holds steady and probably will continue to do so until after the holidays when it will rise some. Although the number of unemployed usually drops in October, this year the increase of housewives and other casual workers seeking work in this high prosperity era keeps unemployment levels relatively unchanged.

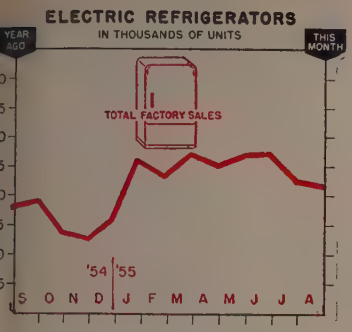
The Commerce department ports personal income pushed an annual rate of $307.5 billi $2.2 billion above its previous r ord pace of July and August. come is nearly $20 billion (nual rate) higher than it was d ing September, 1954. It looks this pace will continue as empl ment keeps its steady gains to p the business glow.

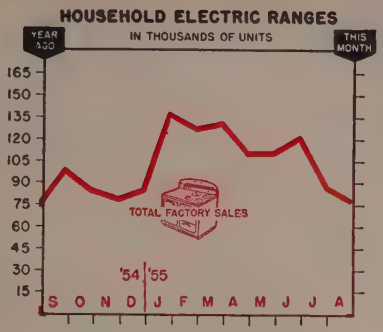
Electric Power Lights Up . . .

Another good indicator of optimistic fuhture are the elec power industry's plans to sp $2.8 billion for expansion in 19 Power production is closely tuned to national business clima

The U. S. Chamber of Comme asserts: "Current business exp sion is geared to peacetime prod tion, not war spending. Busines gaining faith that it can do itself. More than any time si 1929, private enterprise is find itself."

And even though building cre curbs are still tight, the Comme and Labor departments beli that construction spending in 1 may reach a record $44 billion 5 per cent gain over this yea estimated $42-billion peak.





Total Factory Sales—Units

	1955	1954	1953
Jan.	381,197	344,401	325,186
Feb.	338,575	334,122	377,605
Mar.	392,774	330,641	368,498
Apr.	364,298	280,900	366,951
May	390,385	282,164	317,667
June	395,936	303,127	343,114
July	323,240	325,061	298,838
Aug.	310,789	256,665	232,981
Sept.	.....	271,859	231,224
Oct.	.....	190,753	179,749
Nov.	.....	175,557	139,563
Dec.	.....	228,612	197,102
Total	.....	3,323,562	3,378,478

National Electrical Mfrs. Assn.

Total Factory Sales—Units

	1955	1954	1953
Jan.	136,663	101,870	88,145
Feb.	127,188	109,647	114,465
Mar.	130,180	115,393	130,788
Apr.	108,619	92,751	118,999
May	109,263	82,649	114,404
June	120,100	85,854	113,086
July	85,659	80,017	77,836
Aug.	76,158	75,907	74,326
Sept.	.....	99,611	84,481
Oct.	.....	84,321	73,422
Nov.	.....	79,340	55,748
Dec.	.....	85,033	73,870
Total	.....	1,092,393	1,119,570

National Electrical Mfrs. Assn.

Albert M. Cole, Housing & Home inance administrator, says: Enough mortgage money will be vailable in 1956 to support 1.2 illion housing starts"—the level ie Eisenhower administration ould like to see in this election ear. That's 100,000 down from is year and 200,000 less than ie 1950 peak.

uilders Smile . . .

Some of the forecast highlights veal that private construction itlays in 1956 are expected to se about 3 per cent above the 55 expected total of $30 bil-on. Public construction will likely p $13 billion, up 10 per cent from is year's spending level. Private sidential building (nonfarm) will main near or slightly below this ar's $16 billion level.

ore Money for Maintenance...

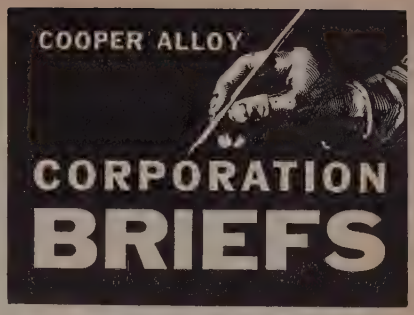
Indicative of the feeling on the rt of many businessmen that 56 will continue good comes ord that many companies are tting more dollars into mainte-nce and repair work to keep rd-driving machines on the go.

Allis-Chalmers Mfg. Co., Milwau-e, states that it has put about million of its profits into plant maintenance and equipment; this in addition to regularly planned expansion of both its tractor and industrial groups.

George W. Kennedy, president of Kelsey-Hayes Wheel Co., Detroit, maker of wheels, brakes and other automotive parts, reveals: "We have expended approximately $5.5 million during the year for property, plant and equipment. Kelsey-Hayes figures similar expenditures in 1956 will about equal this year's.

Trends Fore and Aft . . .

Chrysler Corp. reports orders for 1956 "Flight-Sweep" models have been so high the company's plants are scheduled to ship more than 425,000 cars during the last quarter of this year. This compares with 297,986 cars shipped in the final quarter of 1954 . . . Dwight P. Joyce, president of Glidden Co., Cleveland, says the company's plant expenditures in 1956 will exceed $13 million. This includes an $8-million Baltimore, Md., plant to increase output of titanium dioxide. Mr. Joyce also revealed that Glidden's research and development budget is some 20 per cent higher than it was last year.



● Edited by GEORGE BLACK

CASTING INSTRUMENT HOUSING

Maintaining close dimensional accuracy, fine surface finish and uniform soundness in casting a 1¼ lb. stainless steel instrument housing demanded design conferences with the customer, "tailored" pattern equipment, hand rammed hollow shell cores, closely controlled pouring range, Shellcast® know-how and special handling from shakeout to shipment. For the full story of how this "impossible" casting is cast on the production line, ask for Cooper Alloy AKH (Advanced Know-How) Study #3.

HAIR SETTING STORY

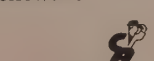
Quikupl® fittings used in an alcohol line for the passage of liquid hair spray net have put an end to leaking connections and enabled rapid disassembly for cleaning purposes. If you're looking for a stainless steel fitting which can be put together in a jiffy without welding, threading or flaring, get the facts on Quikupl. Ask for Bulletin Q100.

PUMPING FERRIC CHLORIDE

Electronic manufacturers have found the answer to the problem of pumping the ferric chloride needed by their Printed Circuit Departments. The Vanton "flex-i-liner" with Buna N body block and Natural Rubber flexible liner is perfect. Since it operates equally well in either direction, a simple reversing switch on the motor provides for quick change in direction of flow.
Catalog VP55 has the facts.

NEW DISTRIBUTOR FOR COOPER ALLOY

Effective September 15th, Western Alloys & Metals Limited became authorized distributors for Cooper Alloy stainless steel valves, fittings and accessories. They will serve the three western Provinces of Canada: British Columbia, Alberta, and Saskatchewan.



Heppenstall's custom-built back-up roll sleeves . . .

. . . work to your over-all cost advantage

Heppenstall Back-Up Roll Sleeves enable you to roll record tonnages . . . decrease downtime . . . and effect over-all cost reduction. They give longer working life in today's high-speed mills because their up-to-the-minute design permits utilization of more effective forging and heat treating operations in their production. Each sleeve's working surface is *tempered to meet your exact hardness specification.*

These mandrel-forged sleeves—made from highest quality Heppenstall-produced alloy steel—are worked thoroughly under modern hydraulic presses to produce a finished product having both maximum density and grain refinement. In addition, they offer you exactness of fit and greater resistance to cracking and spalling during high-speed rolling.

All Heppenstall sleeves are fitted to extremely close tolerances which prevent circumferential slippage. Longitudinal movement is also eliminated because they are further locked in place by both a shoulder and Heppenstall's own patented locking ring.

Heppenstall also produces forged arbors . . . has facilities to grind both arbors and sleeves for perfect shrink-fitting.

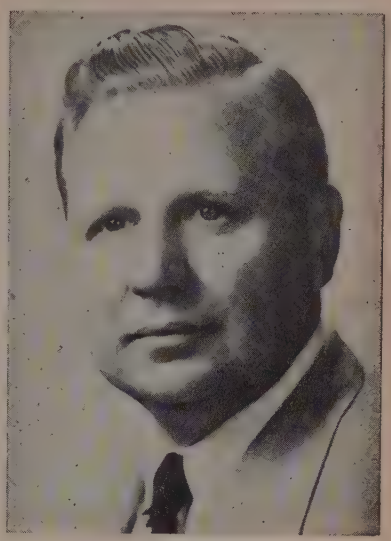
For additional information and technical assistance, contact Heppenstall Co., Pittsburgh 1, Pennsylvania. Sales offices are located in principal cities.

Heppenstall

The most dependable name in forgings

ARNOLD W. HARTIG
. . . Detroit Universal plant mgr.

GEORGE F. MEYER
. . . Warner & Swasey gen. supt.



JOHN M. ANSPACH
. . . De Laval foundry-pattern shop mgr.

rnold W. Hartig was made plant anager and Arthur M. Swigert rks manager of the newly acired Detroit Universal Division Chrysler Corp., which includes e plants, equipment and inven-ries of Universal Products Co. d its subsidiary, Formetal Co. . Hartig served as treasurer d director of Universal Prodts. Mr. Swigert was vice presint-manufacturing.

nt R. Manning was made genl manager and Dan Ruple prodction control manager of the ckson, Mich., division of roquip Corp. George Lagassa, rmer Aeroquip production conl manager, was made plant nager of Elbeeco Inc., a subiary.

mes R. Ewing, former assistant es manager of Motor Products rp., joined Mechanical Handling stems Inc., Detroit, as general es manager.

agara Machine & Tool Works, ffalo, elected George E. Munauer chairman and chief execue officer; Frederick E. Munauer Jr., president and general nager; Franklin A. Reed, vice sident-sales; and Edwin A. nschauer Jr., treasurer.

n D. Blessing, sales manager, s made a vice president of Dow rning Corp., Midland, Mich.

George F. Meyer was named general superintendent of Warner & Swasey Co., Cleveland. He had been first-shift superintendent at the Cleveland plant since 1953 and was given additional duties as maintenance superintendent in September of this year.

Kaiser Aluminum & Chemical Corp. appointed John W. Bizot chief metallurgist at its Permanente, Calif., foil mill. Conrad O. Curell was made chief development engineer at Chicago.

William W. Ogren was made general sales manager, Penco Metals Products Division, Alan Wood Steel Co., Pittsburgh.

Donald R. Helson was made assistant sales manager of Huck Mfg. Co., Detroit.

Sherwood G. Burnett was made manager, process equipment section, equipment division, National Research Corp., Newton, Mass. He is succeeded by T. E. Burleigh Jr. as New England district manager of Naresco Equipment Corp., sales subsidiary.

J. P. Caulfield was made assistant to F. R. Milliken, vice president of Kennecott Copper Corp., in New York. He is succeeded by C. D. Michaelson as general manager, Western Mining Divisions, Salt Lake City, Utah.

John M. Anspach was appointed manager of the foundry and pattern shop of De Laval Steam Turbine Co., Trenton, N. J. He was service engineer with Meehanite Metal Corp.

Chester G. Hawley was made general sales manager, industrial division, Jeffrey Mfg. Co., Columbus, O. He succeeds the late Lincoln Kilbourne.

Robert S. Hood was named vice president - manufacturing at Gertsch Products Inc., Los Angeles.

Norman E. Carlson was made director of engineering for American Car & Foundry Division, ACF Industries Inc. He continues as works manager of the St. Charles, Mo., plant, in addition to his new duties.

William K. Downey was named vice president-sales of Skil Corp., Chicago. He succeeds Paul Watts, transferred to San Francisco as branch manager.

Thomas A. Jermyn Jr. was made chief engineer and assistant superintendent of Kerr-Lakeside Industries Inc., Euclid, O.

W. Raymond Myers was promoted to assistant sales manager, metal products division, Goodyear Tire & Rubber Co., Akron. Charles D.

JACK J. CARLSON
. . . Kaiser Steel appointment

PARK Q. WRAY JR.
. . . heads National Motor Bearing sales

MALCOLM ANDERSON
. . . Gibson Electric sales manager

Thompson was made assistant manager, metal products original equipment sales.

Jack J. Carlson was appointed a vice president of **Kaiser Steel Corp.** and general manager of its Montebello, Calif., fabricating division plant. **B. J. Osborne,** former general manager, moves to the Oakland, Calif., home offices of the company as assistant to the vice president and general manager for consultation for fabricating division operations.

Ra-Vac Inc., High Bridge, N. J., successor to Industrial Radiant Heat Corp., appointed **Henry Thompson** sales manager.

Richard Sampson was made purchasing agent of **Rigidized Metals Corp.,** Buffalo.

A. I. Aalto was named manager of plant facilities of **Alco Products Inc.,** Schenectady, N. Y. He succeeds the late **J. E. Currie.**

Park Q. Wray Jr. was made general sales manager, **National Motor Bearing Co. Inc.,** Redwood City, Calif. He was sales manager of the replacement division.

George A. Jedenoff was made assistant general superintendent at the Pittsburg, Calif., works of **Columbia-Geneva Steel Division,** U. S. Steel Corp. He succeeds **Robert B. Freeman,** now assistant general superintendent of U. S. Steel's Gary, Ind., sheet and tin mill. **J. P. Newman** replaces Mr. Jedenoff as superintendent - cold reduction. **Leonard Tofft** was made division superintendent-blast furnaces at the Geneva, Utah, works of Columbia-Geneva Steel, succeeding the late **Harold B. Makin.**

Malcolm Anderson was made sales manager, **Gibson Electric Co.,** Pittsburgh. He was an independent manufacturers' representative in Minneapolis, handling metallurgical and electronic products.

Harold Etherington and **William Jackel** were made vice presidents of Nuclear Energy Products Division, **ACF Industries Inc.,** New York. **James C. Stowers** was named assistant to the president of the division. Mr. Jackel remains at Albuquerque, N. M where he is manager of comp operations.

Francis J. Duffy was elected pr dent of **La Crosse Trailer Co** La Crosse, Wis. He succe **W. F. Funk,** president and ch man, who announces his sem tirement after 64 years with firm. He remains chairman.

Elmer F. Twyman, vice presid general manager, Yale Mater Handling Division, Philadelp **Yale & Towne Mfg. Co.,** now is cated at executive offices in N York to co-ordinate all dome materials handling operations. is replaced at Philadelphia **John A. Baldinger,** former gen manager, Automatic Transpo tion Co. Division, Chicago. **L. Wolter,** former midwest reg al sales manager of Yale ind trial trucks, succeeds Mr. B inger.

George R. Brown is manager **General Electric Co.'s** metal ing and processing systems s unit, systems sales section, S nectady, N. Y.

Robert E. Hunter was made eral sales manager, **Detroit Di Engine Division,** General Mo Corp., Detroit. He was sales rector of General Motors Di Ltd. of Canada. Mr. Hunter places **E. F. Bentley,** now on cial leave of absence.

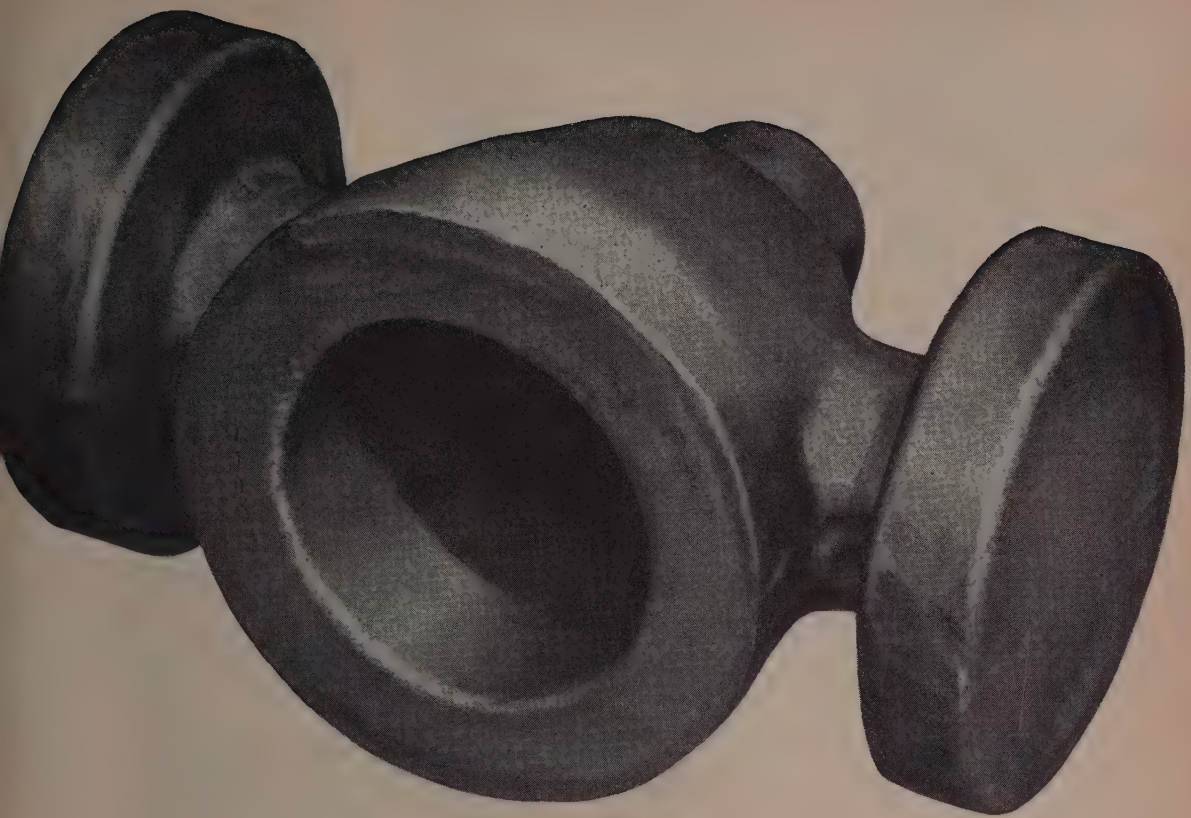
Norbert E. Willkomm succeeds late **J. D. Allen** as acting m ager, **Hamilton Steel Wareho** Jones & Laughlin Steel Co Cleveland.

Dr. Lauchlin M. Currie was pointed a vice president of U **Carbide Nuclear Co.,** division Union Carbide & Carbon Co New York. Dr. Currie was president of National Carbon another division.

Palmetto Steel & Machine Greenville, S. C., elected **Harry New** president-treasurer.

John W. Elsworth was made m ager, special brands division, R **Hollingshead Corp.,** Camden, N He was assistant sales manager

William C. Osborne was adva



IS THIS A FORGING?

Not too long ago, this large component of high quality steel by necessity, would have been a casting, a fabrication or an expensive machining operation.

Now Cameron's Split Die Forging technique produces this piece as an integral forging with internal as well as external contours in sizes from 200 to 5,000 lbs. Machining difficulties are diminished, strength factors are improved and in many cases cost is reduced.

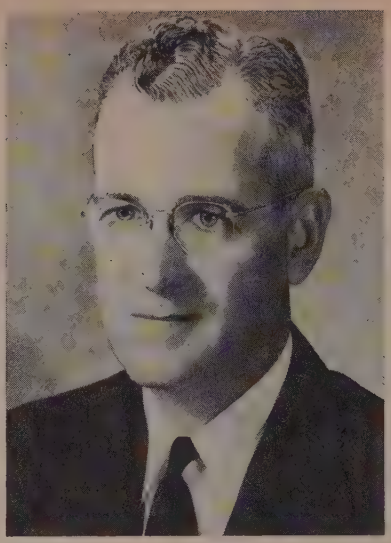
Maybe your product could be improved or more economically produced by using this type of forging.

WRITE **Cameron**

IRON WORKS, Inc.

SPECIAL PRODUCTS DEPARTMENT
P. O. Box 1212, Houston, Texas

LOUIS E. DONDERO
. . . Cleveland Rock Drill plant mgr.



PAUL C. FORD
. . . Wagner Electric div. chief eng.

ROBERT F. LAY
. . . Cooper-Bessemer vice presiden

to manager of engineering and **Everett C. Schmachtenberg** to assistant to the manager of engineering, Harrison, N. J., division, **Worthington Corp.**

Louis E. Dondero was named manager of the **Cleveland Rock Drill** plant of the Le Roi Division, Westinghouse Air Brake Co. He succeeds **Russell R. Morgan**, retired. Mr. Dondero, who joined Le Roi in 1946 as assistant service manager, was most recently manager of the service department.

Howard C. Jones joined **ConVac Division**, Consolidated Engineering Corp., Rochester, N. Y., as director of manufacturing. He was works manager, Delco Appliance Division, General Motors Corp.

Arthur C. Edwards was made field engineer by **Chiksan Co.**, Brea, Calif.

G. Arnold Roberts was made supervisor, engineering department, **Portland Copper & Tank Works**, South Portland, Me.

Wagner Electric Corp., St. Louis, appointed **Paul C. Ford** chief engineer of its electrical division to succeed **C. P. Potter**, retired. Mr. Ford was assistant manager of the transformer engineering division. Mr. Potter remains in a consulting capacity until the first of the year.

E. H. Fisher is in charge of a new industrial sales division of **Oliver Corp.**, Chicago.

Kawneer Co., Niles, Mich., appointed **Charles R. Sigler** manager of engineering. He is replaced by **B. W. Larsen** as manager of production engineering. **Charles L. Grosdeck** was made production manager. **James F. Ryan** was made plant manager at Lexington, Ky., and **John M. Edwards** manager of procurement to succeed Mr. Larsen.

J. C. Lindley is sales manager for the defense contracts organization of **Burroughs Corp.**, Detroit. **Harry B. Rottiers** was made director of defense contracts.

Robert F. Lay, general sales ma ager, **Cooper-Bessemer Corp.**, Vernon, O., was elected vice pre dent-general sales manager.

Walter Gramm succeeds the l **George Skakel Sr.** as chairman **Great Lakes Carbon Corp.**, N York. Mr. Gramm was senior v president.

William H. Barney was ma works manager, **Mather Spri Co.**, Toledo, O.

Minneapolis - Honeywell Regula Co. named **James W. Hughes** gional industrial sales manag for the Midwest, with headqu ters at Chicago. **Raymond Zack** was made industrial sa manager in the Hammond, I branch office.

Robert A. Hummert was made C cago district sales manager **DeWalt Inc.**

Charles E. Keaton Jr. was ma Detroit district manager, **Plast Products Corp.**

OBITUARIES . . .

Albert E. Whyman, 53, vice president in charge of European operations for **E. W. Bliss Co.**, Canton, O., died Nov. 9 in England.

Walter R. Neilson, 63, founder and president, **Neilson Wheel Co.**, Milwaukee, died Nov. 1.

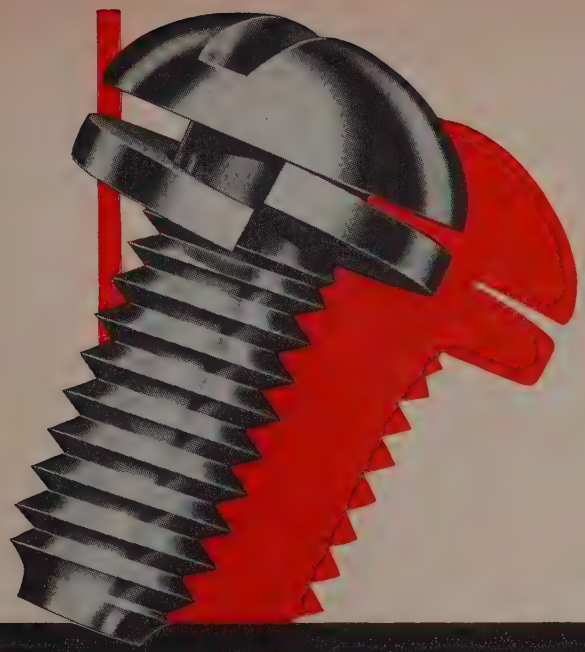
Clarence W. Driver, 68, president, **Sheet Metal Products Co.**, Euclid, O., died Nov. 3.

William E. Van Horn, 75, retired general manager, Buffalo Works, **Otis Elevator Co.**, died Oct. 28.

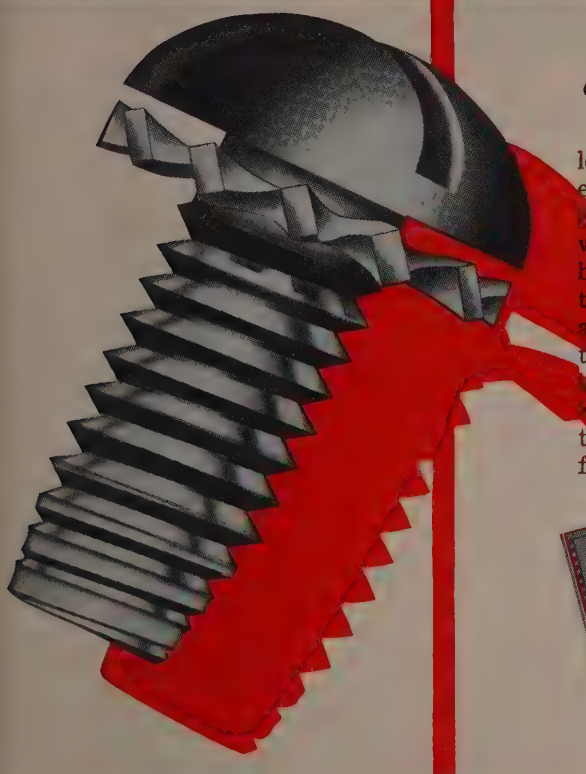
William E. Paris, former vice president, **Willys Motors Inc.**, Tole O., died Nov. 1.

Walter J. Wachowitz Sr., 62, pre dent, **Alloy Products Corp.**, W kesha, Wis., died Nov. 7.

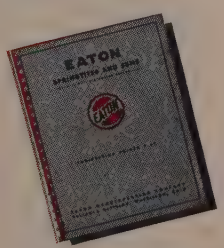
A. S. Feldman, 74, president, **Stu Radiator Core Mfg. Co.**, San Fr cisco, died Oct. 27.



Eaton-Reliance Springtites® and Sems Automatically Reduce Costs . . . eliminate part losses



These days, when production savings can mean the difference between profit and loss at the end of the year, it will pay you to examine the efficiencies offered by Eaton-Reliance Springtites® and Sems. With the spring lock washer as an integral part of the screw or bolt, it is no longer necessary to assemble the two before application. Easier and faster assembly of bolted parts is the result. Waste, through loss of separate lock washers and screws, is reduced. Eaton-Reliance Springtites® and Sems are engineered to speed up your assembly time and give you more efficient fastenings for less.



Send for Engineering Bulletin S-49. The story is there for your consideration and there is no obligation, of course.

RELIANCE DIVISION EATON® MANUFACTURING COMPANY

OFFICE and PLANTS: 514 Charles Ave. MASSILLON, OHIO

Springtites® & Sems · Snap & Retaining Rings · Special Steels · Spring Lock Washers · Hex-Fas-Ners®

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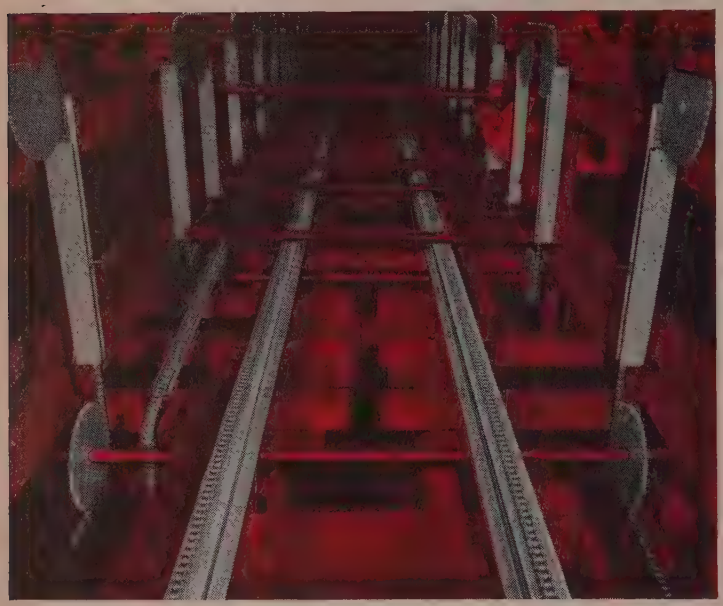
"No breakdown in 14 years with Morse Roller Chain"

—says Ajax Electric Company engine



Ajax Electric Salt Bath Furna point up how roller chain can sa operating costs, cut your downtin give you flexible, dependable pow

Ajax Electric Co., Philadelphia, ma electric salt bath furnaces, used to tem metals. These furnaces use roller ch throughout for conveying and pow transmission.

Alkali cleaner, molten salt, steam—e is a potential threat to the more than 2 feet of chain used. Yet, for 14 ye drives like these have performed ciently, *without a single breakdown.* (R statement below.)

Furnace interior, from end. Main drives lie parallel along bed. Transfer chain drives convey fixture carriers.

←Operator hangs parts on fixture holder. By changing sprocket or adding or removing links, timing of drives can be altered.

"We've worked with Morse Chains for 14 years, and have never experienced a breakdown of this product during that period. And, in our complex installations of electric salt bath furnaces, Morse is giving us excellent results."

Philip V. Atwood

Field Engineer
Ajax Electric Co.

Morse Roller Chain instantly adaptabl

The metal parts hardened in these A Furnaces often require "dip" peri that vary in length. By changing number of links in a drive, or sproc diameter, each step can be speeded up slowed.

You, too, can get superior power tra mission with Morse Roller Chain. P cision-made in all standard sizes pitches. A wide variety of standard special-purpose attachments are availa

Check these advantages of Morse equipment:

- √ Long service life
- √ Low operating cost
- √ Requires minimum maintenance
- √ Wide range of types and sizes
- √ Precision construction

Literature, engineering help FREE

Write today for Catalog C 51-50, or free consultation. Morse has skilled engineers available to help you solve practically any problem involving transmission equipment: Roller Chain, Hy-Vo Chain, Silent Chain, Sprockets, Clutches, and Couplings.

MORSE CHAIN COMPANY
INDUSTRIAL SALES DIVISION
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MORSE

PRODUCTS OF B-W BORG-WARNER

CHAINS, CLUTCHES, AND COUPLINGS

xpansion Spurts

ion-dollar programs reflect lespread confidence in na-'s economic outlook

PANSION of the nation's pro-tive capacity shows no sign of ving down.

tandard Oil of New Jersey will nd $1.1 billion next year for oil loration and capital improve-nts, including 14 new super-kers, in addition to the 27 be- built. An additional $100 mil- will be spent by companies in ch the firm has an interest of -half or less. "As far as I w," said Eugene Holman, chair-n, "it will be the largest one-r capital outlay ever made by industrial concern."

Big Get Bigger—Chrysler Corp. ently announced a $1 billion -year expansion program. Ford ns to spend more than $1 bil- over the next three years. neral Motors, General Electric, stinghouse and other industrial nts have big expansion pro-ms under way.

These spectacular projects are ompanied by a great many aller ones which are being an-nced daily. The aggregate is impressive. Some of the recent ones in the metalworking field are listed here.

Carborundum Co., Niagara Falls, N. Y., will spend $1.5 million to modernize and expand its refrac-tories plant in Falconer, N. Y. The project will be done in progressive stages during the next five years.

McKay Machine Co., Youngs-town, will realize a 25 per cent boost in its production capacity on completion of a $750,000 ex-pansion program now in progress. The firm is constructing an addi-tion to its plant No. 1, has ac-quired a 20,000-sq-ft building in that city and has purchased addi-tional machine tools.

Tappan Stove Co., Mansfield, O., constructed a $300,000 addition to its plant.

Gear Grinding Machine Co., De-troit, completed a plant expansion, adding 33 per cent more floor space. The firm makes gear grind-ing and screw machines.

Ralston Steel Corp., Skokie, Ill., is building a new warehouse in that suburb of Chicago. It will contain 40,000 sq ft of floor area and will be equipped for shearing, slitting, decoiling and pickling operations.

Norton Co., Worcester, Mass., is

(*Please turn to page* 78)

merican Steel & Wire Opens Warehouse in Detroit

e of the first orders of wire rope from American Steel & Wire Division's v Detroit warehouse is measured and re-reeled for shipment by C. J. Shanley. o shown is E. A. Murray, manager of the division's Detroit district sales. new facility will stock wire rope and electrical cable products shipped m A.S.&W.'s plants in Worcester, Mass., Trenton, N. J., and New Haven, Conn.

WHEN IT'S
Special BOLTS
and STUDS
Send your Specifications to
ERIE
40 years' experience in making special bolts, studs, nuts for specific job requirements.

Specialists in Precision High Quality
CONNECTING ROD BOLTS
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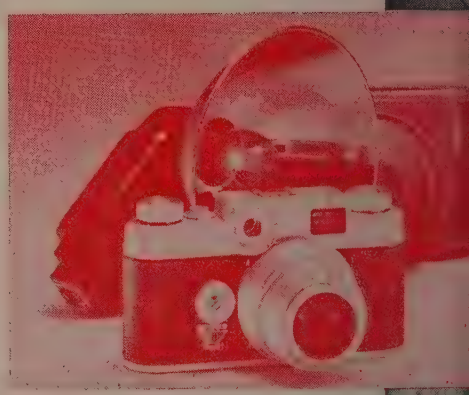
REPRESENTATION IN PRINCIPAL CITIES

STANDARD
technical service clicks at Argus Camera

Personnel at Argus Camera Company were having trouble with the grinding of thread plug gauges. Grinding oils used failed to hold the required accuracy. They called in L. H. Walker, Standard Oil industrial lubrication specialist. He recommended Standard's SUPERLA Thread Grinding Oil A, and Argus began using it. That was four years ago. What happened? SUPERLA Thread Grinding Oil has helped Argus grind thread plug gauges with such accuracy, so consistently, rejects are virtually eliminated.

Small job? Yes. Small volume of oil used? Yes. But the results are big business to Argus Camera. That makes it important to Standard Oil. It is another demonstration of what this unbeatable combination can do when put to work:



1. Standard lubrication specialists capable of giving technical help.
2. Top quality products *that deliver results required.*

Put this combination to work in your plant. In the Midwest there is a lubrication specialist in your nearby Standard Oil office ready to help you. Call him. Or contact Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD

STANDARD OIL COMPANY
(Indiana)

Omer L. Parks (left), tool and gauge grinder for Argus Camera, inspects thread plug gauge with L. H. Walker, Standard Oil industrial engineer. Lyman Walker has been working with customers for 25 years helping them solve problems like the one at Argus. A native of Detroit, Lyman Walker is familiar with the lubrication problems of industry in the territory he serves. This together with his wide experience makes him ideally qualified for this work. Customers find his experience pays off *for them.*

HOW RUGGED IS YOUR ABRASIVE?

Is it rugged enough to prove itself in performance? You can't judge an abrasive by looks, claims or promises. The only test of any abrasive is its *cost per ton of castings cleaned.* Because of exclusive metallurgical characteristics, Malleabrasive gives you the lowest cost per ton cleaned of any premium abrasive on the market! This has been proved in hundreds of production tests by users throughout the country. Prove it in your own production test. *We GUARANTEE that Malleabrasive will give you lowest cost per ton of castings cleaned.*

To order Malleabrasive, or for additional information on running a test, contact Globe Steel Abrasive Co., Mansfield, Ohio.

U. S. Patent #2184926 (Other patents pending)

MALLEABRASIVE®

(*Concluded from page 75*)

constructing a $1,285,000 plant Huntsville, Ala. Products: Fu magnesia, fused zirconia, bo carbide, plus special materials the Atomic Energy Commiss The plant will supplement N ton's electric furnace facilities Chippawa, Ont.

General Electric Co., Scher tady, N. Y., will build a plant c ing more than $5 million at Lyn burg, Va. It will be the home for GE's rectifier dep ment, now at Lynn, Mass., Limerick, Me. Construction start in March.

Rheem Mfg. plans to build plant in Fullerton, Calif., wh will be leased to Rheem Auto tive. The plant and equipm will require an investment of m than $6.5 million. Highly effici plating lines, representing a s stantial increase in capacity, be included at a cost of more t $2 million.

Buys Aluminum Sash Line

Luria Steel & Trading Co New York, purchased the Hun Aluminum Prime Window Divis of F. C. Russell Co., Clevela Hunter makes aluminum sash a plant in Bristol, Pa. The b ness will be expanded under newly organized Luria Build Products Inc., New York. Herb B. Luria is president of both fir

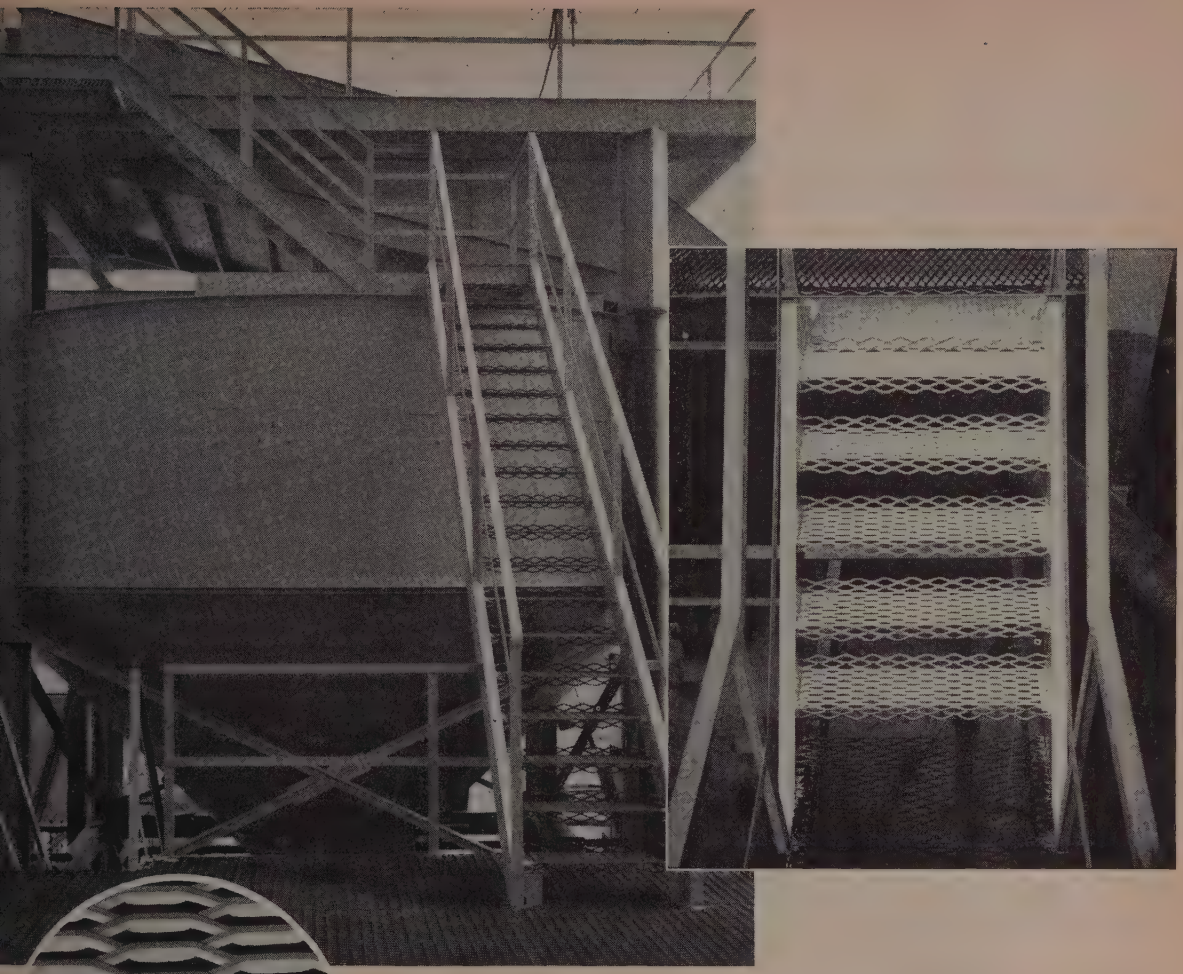
Klem Chemicals Opens Plant

Klem Chemicals Inc., Dearbo Mich., opened a plant at 1905 Central Ave., El Monte, Calif. plant, under Jack Borkman as g eral manager, will make c pounds for metal cleaning, rust moving, and paint removing phosphate coatings.

Gas Machinery Gets Contract

Gas Machinery Co., Clevela will furnish and install a rot furnace, car furnaces, batch-t furnaces, manipulators and que system for the new ring roll plant of Copper Alloy Corp. I being built in Clark townsh Union county, New Jersey. plant was designed by Loewy C struction Co. Inc., New York.

The Cleveland firm also



← cuts costs up to 25% on FLOORING and STAIR TREADS

Armour and Company, near Bartow, Florida, had a grating problem: How to provide 18,000 square feet of open steel flooring and several hundred stair treads, for structures in their new Phosphate Recovery Plant... *economically!* The flooring and treads had to be open to allow drainage of water used in the washer operations. Their solution: Penmetal 4.27 TREADWAY (expanded metal grating).

Used as flooring and stair treads instead of conventional grating, Treadway cuts costs up to 25% per square foot of floor area.

The photographs above illustrate typical sections of floor area, and the unique method used in the fabrication of the stair treads. Each tread is a single piece of Treadway turned to a 90° angle at the front and rear edges. This forms a kick plate and makes the tread even stronger. Most of the treads in this installation are 36" long and will support a 200 lb. man at mid-span, with no apparent deflection.

This rugged, economical steel grating, with slip-resisting safety inherent in its design, is practical for many other applications where safe footing, durability, fabrication costs, and appearance are factors.

Send for complete details of this open steel flooring of economy.

PENN METAL COMPANY, INC.

General Sales Office:
205 East 42nd Street, New York 17, N. Y.
Plant: Parkersburg, W. Va.

METAL MARK Penmetal 1869 OF QUALITY

PM-73

ACCO products

Campbell Abrasive Cut-off Machin

If you cut high-alloy metal, this book can show you the way to boost production

CAMPBELL OFFERS WIDEST SELECTION OF ABRASIVE CUT-OFF MACHINES FOR EVERY NEED

Capacities—from 1" to 12" diam. solids

Hand-operated submerged cutting machines

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Bar-cutting machines for continuous production

All-purpose wet abrasive horizontal cutting machines

Fully-automatic wet abrasive cutting machines

Hydraulically-operated, wet abrasive cutting machines

Rotary-oscillating-hydraulic wet abrasive cutting machines

• If you are now cutting high alloys by any other method, it will pay you to know the many advantages that CAMPBELL abrasive cutting can bring.

LOW COST FACTOR When cutting sections abrasively from bar lengths for forging, the metal may be purchased "unannealed." In some cases, saving the annealing cost will more than pay for cutting. Smooth cutting of abrasive process saves cost of smoothing operations. Accuracy of abrasive method reduces scrap loss.

HIGH QUALITY FACTOR High quality control standards are usually maintained by laboratory testing of specimen cuts. With abrasive cutting, metal can be cut in practically any condition—soft, hard, annealed or unannealed—with cut-off pieces ready for deep etching.

• Find out TODAY what the CAMPBELL methods can do for you. Testing procedure by CAMPBELL engineers will show conclusively whether abrasive cutting machines will save YOU money.

Write for **DH-301** *"Principles of Abrasive Cutting" today*

ACCO

TRADE MARK

Campbell Machine Division

AMERICAN CHAIN & CABLE

925 Connecticut Avenue, Bridgeport 2, Connecticut

Better Value

ded a contract by Sharon Corp., Sharon, Pa., to install ntinuous strip annealing fur- for its Detroit Tube & Steel ion, Detroit.

ral Cable Builds in South

neral Cable Corp., New York, onstructing a manufacturing on E. Hanna street, Tampa, The first unit will have about 0 sq ft of floor space and will quipped to make paper tele- e cable and other wires and s.

s Industrial Products Unit

ryland Shipbuilding & Dry- Co., Baltimore, established ndustrial Products Division. a number of years the firm made many types of power and industrial equipment. combining and co-ordinating activities in the new division. . Jameson is manager of en- ring; Philip Myers Jr. is ger of sales.

pping Firm Changes Hands

ogress Mfg. Co. Inc., Philadel- maker of fluorescent and in- escent fixtures for home use, ired Judson & Rose Inc., that metal stamping manufacturer. Rose, president of Judson & , will be chief executive officer e subsidiary.

der-Root Builds Plant

eder - Root Inc., Hartford, ., is building a $1.5-million at Altoona, Pa. One of the modern diecasting opera- , along with closely allied as- ly and machining depart- s, will be installed to make line-pump computers and oil- registers.

ributor Opens New Plants

etal Goods Corp., metal dis- utor, opened a new warehouse headquarters building at 8800 Blvd., St. Louis. Nelson er is the St. Louis district ager. The firm also opened a t at Madison and Industrial ues, Wichita, Kans., under the

(*Please turn to page* 84)

DO YOU NEED ANSWERS TO THESE QUESTIONS?

1 How can I electroclean steel at lower cost?

2 How can I find a brass cleaner that gives better protection against tarnishing?

3 How can I reduce rejects due to faulty electrocleaning of zinc die castings?

***Answer* 1** Following an Oakite recommendation, one plater made a small change in his steel-cleaning cycle and soon had two tankfuls of cleaning solution doing the work of three—and the plate adhesion was improved. *See booklet offered below.*

***Answer* 2** Oakite has a new brass cleaner that provides scientific protection against the oxygen that tarnishes brass and other copper alloys during the application of reverse current. *See booklet offered below.*

***Answer* 3** Oakite has an anodic conditioner that offers brighter plating of zinc die castings . . . with no anodic blackening and fewer rejects. *See booklet offered below.*

FREE For more information about the electrocleaning of steel, brass or zinc die castings, ask for one or all of the booklets listed in the coupon.

four good steps toward better electropla on steel
what's NEW for electrocleaning brass and other copper alloys
Good news about electrocleaning zinc-base die castings
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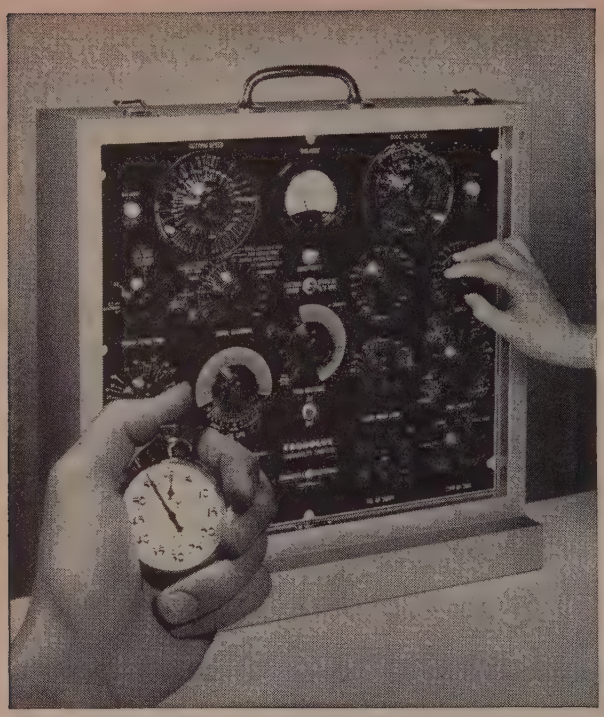
Send me the free booklets I have checked below:

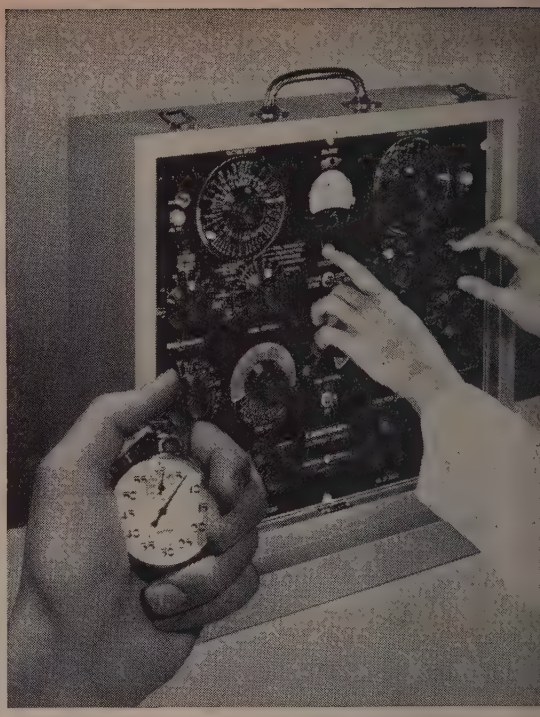
☐ "Four good steps toward better electroplating on steel"
☐ "What's NEW for electrocleaning brass and other copper alloys"
☐ "Good news about electrocleaning zinc-base die castings"

Name.....

Company.....

Address.....





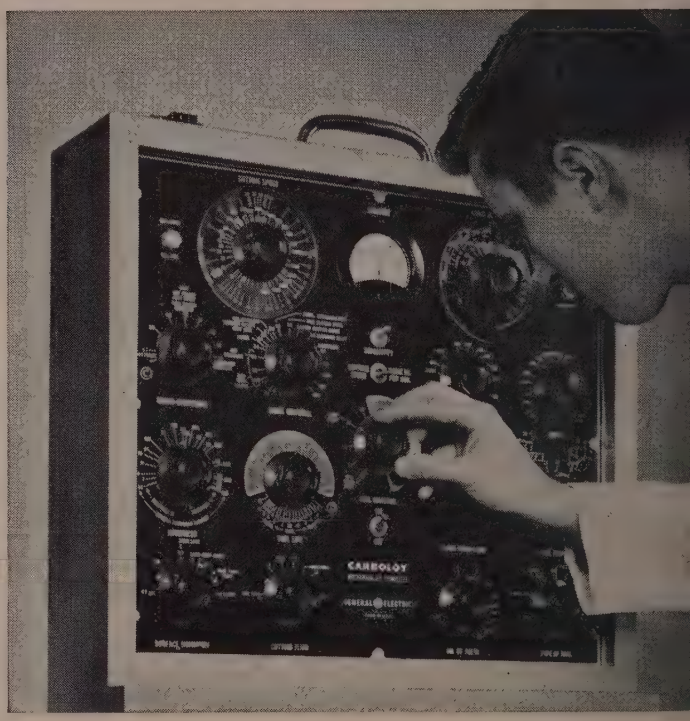
SOLVE MACHINING PROBLEMS IN SECON

The Carboloy Machinability Computer can determine the most efficient values for any of these 19 basic operating variables:

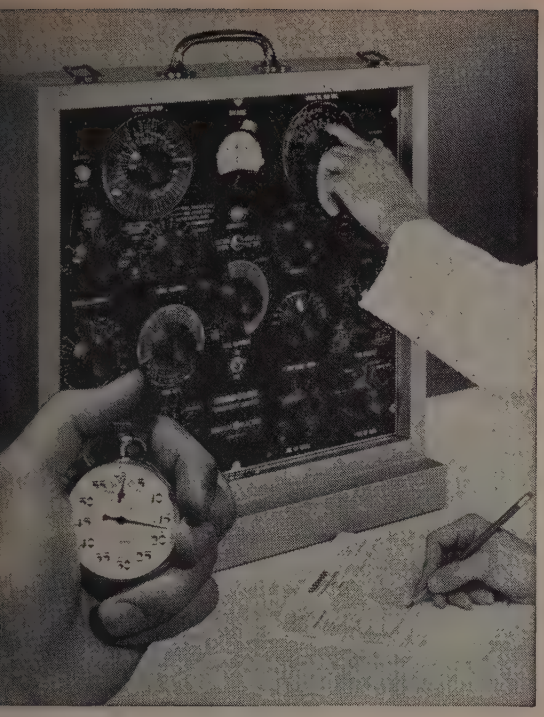
Material to be cut: Work material, microstructure, hardness, surface condition.

Cutting tool: Tool material, tool life, flank wear land, tool profile, type of tool, number of teeth.

Cutting conditions: Cutting fluids, feed, depth of cut, cutting speed, motor horsepower, cubic inches per minute, unit horsepower, work diameter, R.P.M.



CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY



Set dials for the values of each of the known variables. (Time: 1 — 2 minutes.)

Turn dial of unknown variable until meter balances at zero setting. (Time: 10 — 15 secs.)

Read the answer directly off the dial. No computations are necessary. (Time: 10 secs.)

ITH CARBOLOY MACHINABILITY COMPUTER

- **Calculate production, tool life, horsepower, or any of 16 other basic machining variables**
- **Eliminate wasteful tryout runs, improve existing setups**

The Carboloy Machinability Computer is a new engineering tool designed to solve complex machine setup problems in seconds, instead of hours.

It calculates the effect of the 19 most critical machining variables on the material to be cut, the cutting tool, and the cutting conditions . . . shows how to set up optimum operating conditions for any metal-cutting job, and how to improve existing setups by the right variation of operating conditions.

For production men, methods men, etc.

The Computer assists production men by determining rate of metal removal, and by immediately showing how production is affected by changes in feed, speed, depth of cut, tool material, and other key variables.

The Computer eliminates wasteful, nonproductive trial runs, saving valuable stock and setup time. It also determines machine output for methods men, pieces per hour for estimators, and it answers other problems pertaining to machining . . . providing accurate solutions in seconds for problems that normally take hours for even approximate answers.

Easy to use

The Carboloy Machinability Computer is easy to operate. Anyone with machining experience can use it after a short familiarization period.

The computer is portable (weighs only 32 lbs.), battery-operated, and measures 21″ x 7″ x 20″. The price of the computer is $495, f.o.b. factory, Detroit.

Whether your plant is large or small, the Carboloy Machinability Computer can pay for itself by increasing production, reducing manpower costs. For full details, or to arrange a demonstration at your plant, send coupon today.

CARBOLOY
Department of General Electric Company
11141 E. 8 Mile Road, Detroit 32, Michigan

☐ Send me information on the Carboloy Machinability Computer.

☐ Have a representative call to demonstrate the Computer.

Name _____

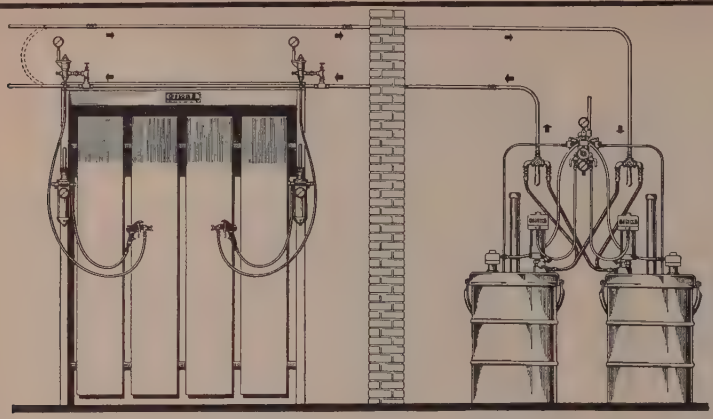
Title _____

Company _____

City _____ Zone ____ State ____

"Carboloy" is the trademark for products of the Carboloy Department of General Electric Company

WHAT'S NEW in material handling pumps



pump paint through a mile of pipe... ...supply any number of spray guns

Binks new air-operated material handling pumps open the way to paint circulating systems for every size plant.

In a system of this kind, paint is circulated under pressure past each spray station and back to the drum. Binks new material handling pumps are ideal for this purpose. They can force paints of average spraying viscosity through a mile of suitable piping, *direct from the original drum* or from mixing tanks.

Now you can centralize all material handling, paint mixing, and viscosity control in one spot, with these major advantages: Color matching of component parts is easy. No time is required to transport paints to the spray stations or to clean and fill pressure tanks. Spillage and paint contamination are eliminated.

The above diagram shows a two-pump-per-color system. One pump supplies paint to the spray guns while the other is raised to allow replacement of the empty drum... or is agitating the paint prior to pumping. A valve switches the flow from one pump to the other. Not a moment's production is lost.

Here are some of the new features which make Binks pumps your best buy:

Power-plus: These new pumps will feed paint to any number of spray guns.

Delivers more: Pumps paint on both up and down stroke. Have longer stroke for greater volume.

Low maintenance: Ruggedly built to stand up under hard, continuous operation. Dust and dirt can't enter the new Auto-Cycle air valve. Fluids cannot work up into the motor. No lubrication required.

Uses less air: Large ports minimize back pressure. Precision manufacture reduces friction.

Binks air-operated pump elevator speeds up drum changing

This new Model 41-9000 air-operated pump elevator pays for itself many times over in the time and labor it saves. It quickly lifts the entire pump assembly clear of a 55-gallon drum and holds it there while drums are changed.

Send today for your copy of Binks Bulletin 701 which describes the many advantages and economies of a paint circulating system using Binks Material Handling Pumps. Binks engineers will be glad to help you select and install the right equipment. Write to the address below:

Binks
EVERYTHING FOR SPRAY PAINTING

GUNS

COMPRESSORS

FREE INSTRUCTION

Binks Manufacturing Company
3122-30 Carroll Ave., West, Chicago 12, Illinois

150-55

REPRESENTATIVES IN PRINCIPAL U. S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY

(*Concluded from page* 81)

managership of Clark Brown third one at 1970 Latham, M phis, Tenn., under the mana ship of G. C. Meek Jr.

Enters Machinery Field

Production Machinery Corp. been organized to make slitt shearing, coil and sheet hand equipment and similar machin Headquarters are at 38905 Me Ave., Cleveland. Neil J. Ranne president.

Ekco-Alcoa Containers Forme

Ekco-Alcoa Containers Inc. been formed to manufacture alu num foil containers. The comp is owned jointly by Ekco P ucts Co. and Aluminum Co. America. A $5-million plant, an area of 165,000 sq ft, is u construction in Cook county, Wheeling, Ill. John M. Mitc previously manager of Alcoa's port Division and Commercial search Division, is president general manager of the new pany.

ASSOCIATION

Offices of **Electric Overh Crane Institute** have been tr ferred from New York to 1 Tho Circle, Washington 5, D. C. Jo Peritz has been appointed ex tive secretary. W. W. Pea president of Northern Enginee Works, Detroit, is president of institute. J. T. Sohn of Bed Foundry & Machine Co., Bedf Ind., is vice president.

Conveyor Equipment Manu turers Association, Washing elected these officers: Presid E. E. Boberg, Standard Conv Co., North St. Paul, Minn.; president, J. H. Walker, Fair Engineering Co., Marion, O.; tr urer, A. W. Rich, Fairmont chinery Co., Fairmont, W. Va.; secretary, H. E. Murken, Hew Robins Inc., New York.

National Tool & Die Manu turers Association elected t officers: President, J. N. Hu B & H Specialty Co. Inc., India

what is the gauge of steel plate quality?

The quality of any product is hard to gauge exactly. Two of the most accurate gauges of steel plate quality are, first, the degree of control exercised over its production—during *every* step from iron ore to finished plate—and, second, its acceptance by fabricators and users.

When you order Claymont Carbon and Alloy Steel Plates—including Abrasion-Resistant and Low Alloy High Strength Steel Plates—you are assured of top quality . . . because each step is conducted in CF&I's own blast furnaces, open hearths and rolling mills, following the most rigid control and testing standards. Throughout the operation, the steel is constantly tested by our metallurgists to assure proper physical and chemical properties, to meet the exact requirements of *your* job.

But in the final analysis, the proof of product quality is always in its use. Claymont plates are being ordered by fabricators everywhere for a wide variety of uses, because they have proved their high quality time after time. You can order them in standard ASTM and AISI specifications, as well as special plates for special applications. To get full details, contact our nearest sales office or write to Wickwire Spencer Steel Division, The Colorado Fuel and Iron Corporation, P. O. Box 1951, Wilmington, Del.

CF&I **Claymont Steel Products**

3538

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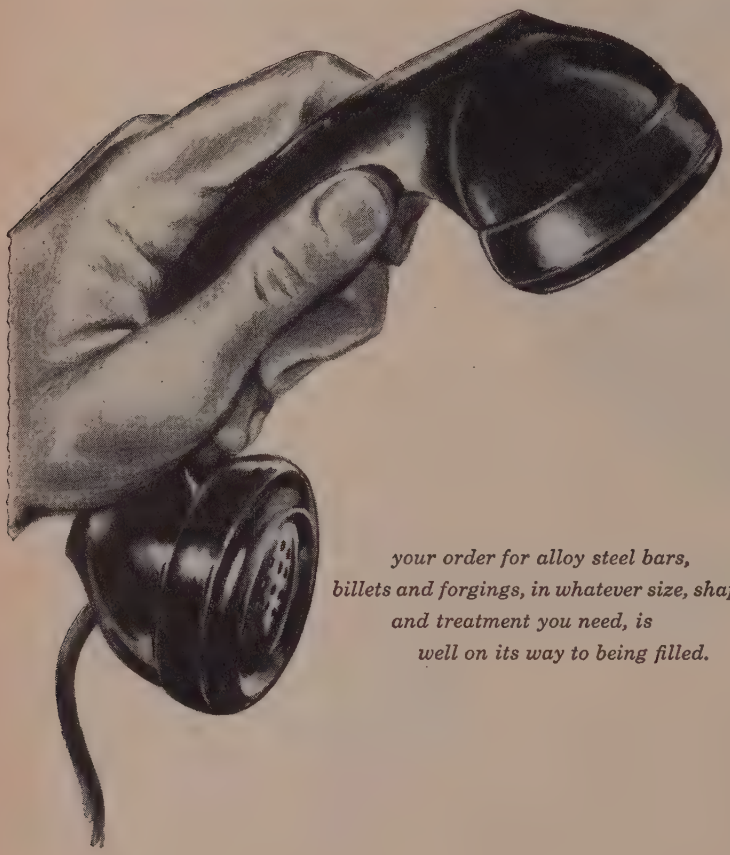
Orleans • New York • Oakland • Odessa • Oklahoma City • Philadelphia • Phoenix • Portland • Pueblo • Salt Lake City • San Francisco • Seattle • Spokane • Tulsa • Wichita
CANADIAN REPRESENTATIVES AT: Edmonton • Toronto • Vancouver • Winnipeg

OTHER CLAYMONT PRODUCTS

ess-Clad Plates • Flanged and Dished Heads • Manhole Fittings and Covers • Large Diameter Welded Steel Pipe • Flame Cut Steel Plate Shapes • Lectro-Clad Nickel Plated Steel

Before you hang up,



your order for alloy steel bars, billets and forgings, in whatever size, shape and treatment you need, is well on its way to being filled.

All seven of our modern warehouses are located in principal industrial areas . . . near you. Each one is well-stocked: equipped to fill your alloy steel requirements promptly, whether you need standard AISI, SAE or our own special HY-TEN steels—"the standard steels of tomorrow". Every warehouse, too, is staffed with experts in metallurgy who are ready to serve you.

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olis; first vice president, Herb Harig, Harig Mfg. Corp., Chica second vice president, P. R. M silius, Producto Machine Bridgeport, Conn.; secretary, G. Murdock, Arrowsmith Tool Die Corp., Los Angeles; treasu R. C. Renner, East Dayton Too Die Co., Dayton, O.

Drop Forging Association move its headquarters on Dec to 419 S. Walnut St., Lansi Mich. Richard Marcus has b appointed assistant secreta treasurer.

NEW ADDRESSES

American Management Asso tion moved its administrative he quarters to 1515 Broadway, N York 36, N. Y.

Gilbert-North Inc. moved to r quarters at the Reynolds Ind trial Development, 4 miles so of Greenville, Pa. Yard equipm is designed to handle alloy sc at top efficiency.

Grobet File Co. of America moved its offices, factory warehouse to Carlstadt, N. J. firm makes rotary files, count sinks and other industrial tools.

REPRESENTATIVES

Tipp Mfg. Co., Tipp City, O., pointed as its sales represen tives: Alfred B. King Co., No Haven, Conn.; Elmer A. Skonb of Machinery Sales Co., Louisvi H. M. Sawrie & Co., Chattanoo Tenn. Tipp makes Cable-Way c veyors.

Oliver Iron & Steel Corp.'s P Line Materials Division, Pi burgh, appointed Shaffer & Nels Seattle, and Roy Peck Associat Arcadia, Calif., representatives their territories.

Rivett Lathe & Grinder Boston, appointed Benedict En neering & Sales Co., Birmingha as representative for its line air and hydraulic valves and c inders and power units.

Technical Outlook

ANOTHER STEP—A milestone on the road to the automatic steel mill was unveiled at U. S. Steel's Irwin Works on Oct. 10. It's an automatic gage control system with nine transistors for a "brain," developed jointly with GE. Operating on a 5-stand tandem cold reduction mill, it holds final tolerances to ±0.0001-in. The gage is the first to use screw down control to vary reduction on the first stand in combination with a vernier system regulating roll speed on the last stand.

HEAT TRANSFER—New low melting alloys which may be used as liquid metal heat transfer media have been discovered. They are in the group that includes bismuth, indium, lead, tin and thallium, according to a report of Navy research. The alloys have freezing points below 210° F and do not expand on freezing and cooling to room temperature. Vapor pressure is low up to 1500° F. They do not cause static corrosion of construction materials.

TELLTALE DROP—A drop of water tells when metal surfaces are clean enough for maximum strength bonding with adhesives. A drop that stands up sharply, making a steep angle of contact, indicates a surface that needs better cleaning for good bonding. If the drop spreads out or makes a low angle of contact, the adhesive joint should be a strong one, says Franklin Institute.

GRINDING STRESSES—Recent tests indicate lubrication is more important than cooling in grinding hardened steels. In his experiments, E. R. Letner, senior fellow, Mellon Institute, Pittsburgh, used air, two concentrations of rust inhibitor in water, six water-miscible oils and four straight grinding oils. He reported at ASME's annual meeting: 1. Stresses produced with water-rust inhibitor coolants or miscible oils differed little from those in dry grinding. 2. Straight grinding oils gave some reduction in peak tensile stresses, and are conductive to high compressive stresses close to the surface. 3. Effectiveness of the fluid depends on its ability to reduce stresses during chip formation rather than the ability to take heat away.

LONG LIFE—A beryllium-copper plunger tip on a 450-ton, cold-chamber, diecasting machine still is in good condition after more than 510,000 cycles. Ohio Casting Co., Columbus, O., says this amount of work would wear out 70 of the tips it previously used. The Be-Cu tips are used for such jobs as diecasting aluminum locknuts for plumbing at 160 cycles per hour.

WATER REDUCTIONS—The first water-cooled rectifier transformers to be used on an aluminum pot line cost less, weigh 35 per cent less and occupy only half the floor area of previously used air-cooled ones. Westinghouse installed them at Anaconda Aluminum Co., Columbia Falls, Mont.

BIGGER BRAIDS—If you think of a use for tubular metal braid 30 in. in diameter, there's a machine at the Niles, Mich., plant of the National-Standard Co. that can make it. It's producing metal braided hose coverings up to 22 in. in diameter, with wire as thick as 0.028-in.

HIGH-TEMP HYDRAULICS—Future development of hydraulic components for high-temperature applications should center on improvement of the seals rather than mechanical design. That's the conclusion of K. I. Postel, chief design engineer, aircraft products, Vickers Inc. During tests, inlet and ambient temperatures were maintained at 550° F.

Maintenance for Automation

By ROBERT F. HUBER
Machine Tool Editor

ONE THING is certain about automation. It's forcing seat-of-the-pants maintenance out of style.

Where the maintenance man used to be a clever jack-of-all-trades, he's now a trained specialist. Where he used to be on call to make repairs, he's now on patrol to anticipate repairs.

The System—This, most authorities agree, is the key to successful maintenance of an automated plant or line: You must have a system, and the system must be positive.

It may take a subtle shift in the thinking of maintenance supervision. Instead of maintaining machines, they're now required to maintain production. The difference is slight but fundamental.

Detectives—Down time becomes a veritable monster with automation. The machine that turns out hundreds or even thousands of parts in an hour can't be spared from the production line. It becomes critically important to shave minutes off any down time.

Even the time required for the trouble to be reported and the maintenance man to get to the machine is worth saving.

Teams—The answer lies in having one or more maintenance men cover a production area. Their full-time job is to patrol and service equipment in that area. For example, John H. Keating, vice president of manufacturing, Monarch Aluminum Mfg. Co., Cleveland, says the company had to assign a special maintenance man to watch their new continuous melting furnace.

At a recent meeting of the American Society of Mechanical Engineers, N. K. Conrad, superintendent of general maintenance at Ford Motor Co.'s Cleveland Engine Plant No. 1, put it this way:

"In the past, maintenance headquarters were located in one central area with most of the trouble calls coming to that point. Experience soon showed this to be a costly manner in which to operate this type plant. We found our skilled trades demanding a hi degree of versatility than we c acquire without many more y of experience and training. was due to the complexity of equipment, plus the different t of machine tools and varied erations.

"We also found," he conti "that the waiting period from time the machinery or equip went down to the time the re man reached the scene was e sive, thus raising costs of tha partment . . . therefore, instea having one central shop . . have divided our plant into 'productive maintenance' area

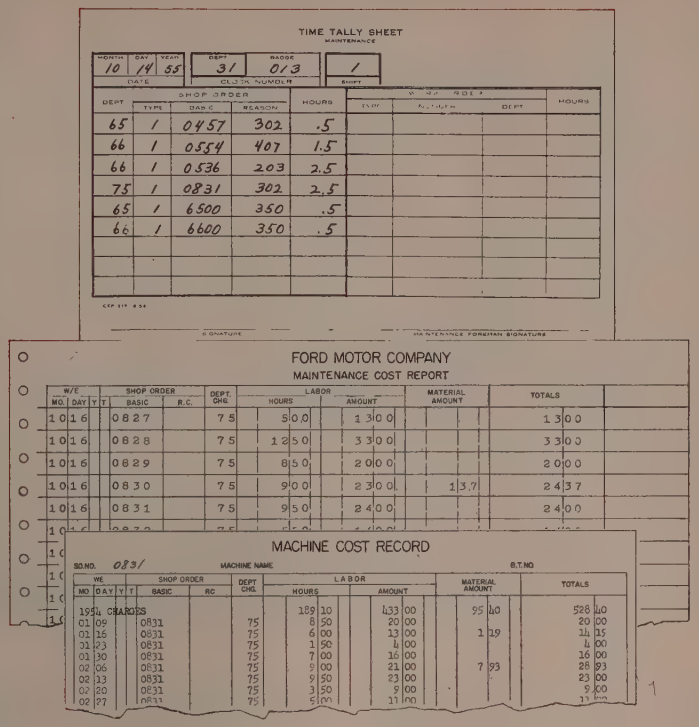
Tinkerless—At the Clevelan gine plant, each of these areas a full-fledged maintenance de ment. One man is responsible all maintenance done in the He has foremen on each shif sponsible to him. Hourly w ers are assigned to each area man, including electricians, chine repairmen, hydraulic pneumatic specialists, toolma

and fixturemen) and some-
s a pipefitter and millwright.
th supervision and hourly per-
el are thoroughly acquainted
equipment in their area.
ugh constant surveillance,
soon determine which perish-
parts must be stocked for
ial equipment and machines,
g with standard maintenance
.

nother sound reason for area
s: The operator is less apt to
r. If something is out of ad-
ment and the maintenance
is in another part of the
t, an operator is likely to try
nake the adjustment himself.
e maintenance man is only a
steps away, the operator prob-
won't waste time trying to
nything—he'll let George do
From a maintenance point of
, this is almost essential.

reventive or Corrective? —
re's a difference of opinion as
hether preventive maintenance
ractical for automation.
e side holds that it never was
important. The idea of pre-
ive maintenance is to adjust,
ir and replace parts before
kdown.
ith automation, advocates
t out, avoidance of breakdown
ritical. Machines and equip-
can be scheduled for minor
haul at regular intervals.
e other side figures it is bet-
o tolerate a few breakdowns
it is to spend excessively on
entive maintenance. They say
unless equipment gets into
ble, you can't afford to take
t of service.

iddle Ground — Probably the
t of greatest return for most
mated installations lies some-
e between these two points.
e equipment isn't in operation
a full three shifts, it may be
ible to replace bearings,
es, motors, etc., while the
pment is idle—and do so be-
failure.
the equipment is going full
ll three shifts, it becomes nec-
y to compromise between
kdown repair and interruption
preventive measures.
rtainly, maintenance person-
(and everybody else on the
should be preventive minded.



TIME TALLY SHEET
MAINTENANCE

MONTH	DAY	YEAR	DEPT	BADGE	
10	14	55	31	013	1
DATE			CLOCK NUMBER		SHIFT

DEPT	SHOP ORDER TYPE	SHOP ORDER BASIC	SHOP ORDER REASON	HOURS	WORK ORDER DEPT	WORK ORDER NUMBER	WORK ORDER DEPT	HOURS
65	1	0457	302	.5				
66	1	0554	407	1.5				
66	1	0536	203	2.5				
75	1	0831	302	2.5				
65	1	6500	350	.5				
66	1	6600	350	.5				

SIGNATURE — MAINTENANCE FOREMAN SIGNATURE

FORD MOTOR COMPANY
MAINTENANCE COST REPORT

W/E MO.	DAY	T	SHOP ORDER BASIC	R.C.	DEPT. CHG.	LABOR HOURS	LABOR AMOUNT	MATERIAL AMOUNT	TOTALS
10	16		0827		75	50.0	1300		1300
10	16		0828		75	125.0	3300		3300
10	16		0829		75	85.0	2000		2000
10	16		0830		75	90.0	2300	137	2437
10	16		0831		75	95.0	2400		2400

MACHINE COST RECORD

EQ.NO. 0831 MACHINE NAME B.T.NO

WE MO	DAY	T	SHOP ORDER BASIC	RC	DEPT CHG.	LABOR HOURS	LABOR AMOUNT	MATERIAL AMOUNT	TOTALS
1954 CHARGES						189 10	433 00	95 40	528 40
01	09		0831		75	8 50	20 00		20 00
01	16		0831		75	6 00	13 00	1 29	14 15
01	23		0831		75	1 50	4 00		4 00
01	30		0831		75	7 00	16 00		16 00
02	06		0831		75	9 00	21 00	7 93	28 93
02	13		0831		75	9 50	23 00		23 00
02	20		0831		75	3 50	9 00		9 00
02	27		0831		75	5 00	11 00		11 00

THE MAINTENANCE cost control system at Ford Motor Co.'s Cleveland engine plant is regarded as intricate, accurate and essential by plant management.

Maintenance crews of four or more men are assigned to specific areas, including several departments. These teams handle all routine maintenance problems.

Maintenance men make a report every day, showing what work was done, where it was done, materials used, trouble encountered, etc. The information works its way through the system to Machine Cost Record Cards. They tell the expense story on each piece of equipment in the shop, week by week.

Here's how it works:

Hourly maintenance men assigned to production areas fill out these tally sheets. Information includes: Department in which work was done; type of work (for machine repair, for tooling, fixtures, etc.); code number of equipment; reason (taken from numbered check list of troubles); and time spent on the job. Section at right is for materials ordered or for rebuilding, erection, etc.

Information from daily tally sheets goes to IBM, is entered on a detailed cost run and then to this Transfer Posting Run. Sheet shows daily totals of work and material charges for each machine in a depatrment.

Machine record is then entered on cost record card. This shows cumulative costs for maintaining and servicing the equipment. Entries are made weekly. This information helps management spot equipment that's too expensive. It can be used in selecting equipment that is ready for replacement, and can aid selection of new equipment.

Seven Signposts for a Maintenance System

Put maintenance men on the production line where they can anticipate trouble. Keep them aware of equipment performance

Acquaint maintenance crews with new equipment before it's installed. Show them drawings or send them to the builder's plant for instruction

Adhere to rigid schedules on routine maintenance items, such as lubrication. Use preventive maintenance when possible

Standardize on systems and components to simplify maintenance and reduce stock of spare parts

Determine an adequate spare-parts inventory and keep it in stock for maintenance

Establish adequate maintenance cost records for long-run economy

Establish close communication between production and maintenance supervision

Danger signs like a noisy valve or hydraulic circuit, excessively hot bearings and part-time electrical quirks should be heeded. When the equipment goes down for, say, a routine tool change, the cause of the danger signs can be corrected, and little or no production time is lost.

Also, maintenance personnel should be in touch with quality control. At Ford, Cleveland, they watch quality control charts for signs of equipment failure.

Routine — Lubrication, tool change and routine inspection of working parts must be performed on a scheduled basis. These can be, and often are, handled by someone other than the regular maintenance crew.

In automated machining, operators take care of tool change. Tool control boards warn which tools are nearing the end of their life. When the machine is stopped, all tools that are approaching the end of their life are replaced at once.

Lubrication can be handled from a central plant maintenance department or by area crews. Lubrication personnel should be given charts that show which points on the equipment require service, how often they should be lubricated, and what lubricant should be used. In many cases, it's essential to furnish the man with a checklist so he can check off points as he makes his rounds.

This load has been lightened by application of centralized lubrication to all critical points.

Records — Complexity of the maintenance operation varies directly with the complexity of production. Accurate records of repairs made are essential to long-run maintenance economy.

Records should show how much time is spent repairing a piece of equipment, what replacement parts are needed, nature of the trouble, etc. These records are no help in getting the immediate maintenance job done. They *are,* in a sense, preventive maintenance (see illustration for summary of one system).

Properly used, these records will show which equipment is susceptible to casualty, and what kind of trouble occurs most frequently. The records will put the spotlight on equipment that's out of line, cost-wise, will serve as a guide to stocking spare parts and will influence assignment of personnel to the maintenance crew.

People—At the beginning of the automation boom, many prognosticators said plants eventually would be maintained by a staff of engineers and technicians. They hinted that a Ph.D. wouldn't out of place on maintenance c

This isn't true—at least, now. Most experience shows a good maintenance man b automation is a good mainter man now. There are two d ences: The first is his meth operation; attribute that to system. The second is his specialization spells this chan

It's a rare bird that's qua to be *the* maintenance man o automation line. The all-r maintenance man, like the fa doctor, is disappearing from American scene. Today's ma nance man is being trained t agnose and treat specialized il the hydraulic system, or the trical network, or the tooling

At the 1954 Production Ma Tool Hydraulic Forum, Gre McKeown, product service ager, Vickers Inc., said: " trained specialists should be for hydraulic maintenance v Anyone charged with maintai hydraulic equipment should b miliar, not only with the func of the hydraulic units but with the degree of precision w must be retained in hydr equipment to provide satisfa performance."

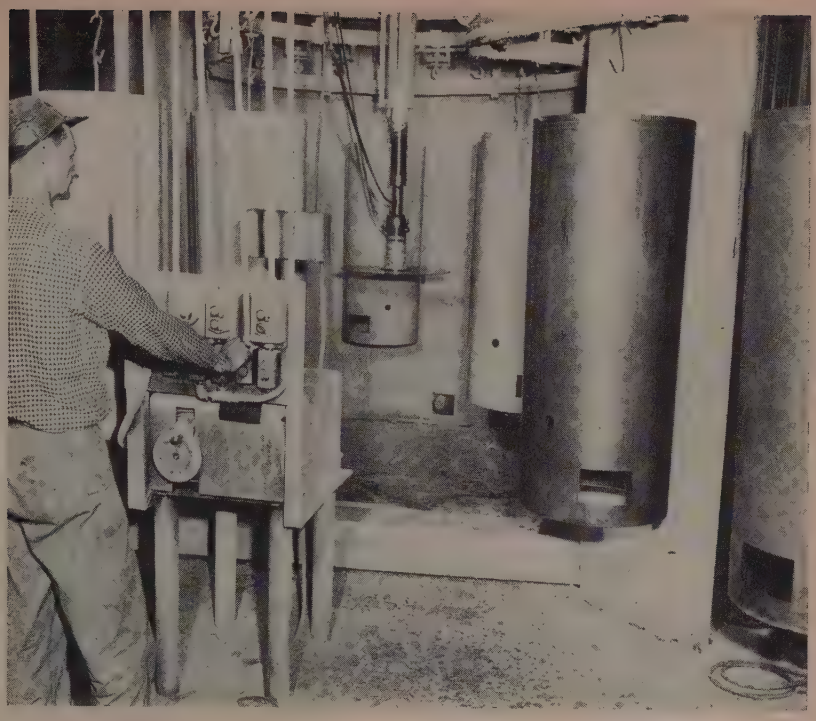
Training—How do you edu your maintenance men for mation? The automobile panies, and others with a si stake in automation, are spen thousands to train mainten crews in electrical troubleshoo hydraulic and pneumatic circu mechanics and electronics. C companies are sponsoring co in these subjects at local classes.

One of the easiest, and mos fective, methods is to make us the equipment builders. Os Mfg. Co., Cleveland builde foundry automation, has cus ers' men come to their plan talk with their engineers an learn about the equipment, before it's installed. It's a rule to have your maintenance sit down with the prints and d ings to learn what circuits trol what functions. This bring big dividends, particu in the run-in stages when bug worked out of the equipment.

Vater heater jackets, re-olving around this electro-atic painting disc, get . . .

Better Finishes at Lower Cost

By THOMAS I. MASTIN
Chief Engineer
M. M. Hedges Mfg. Co. Inc.
Chattanooga, Tenn.



TING PRODUCTION of heater jackets has tripled we put in an electrostatic system and new conveying ment. Finish is improved paint mileage has gone up five to twelve jackets per n.

e M. M. Hedges Mfg. Co. s automatic gas and electric heaters in round and table models. Sizes range from 10 0-gallon capacities. Most pop-model is a 30-gallon gas unit.

fore—When jackets were fin- by hand spray, our paint de-ment was getting five jackets gallon of enamel. Later, we went to the Ransburgh No. 1 process of electrostatic spray painting (it uses spray guns) and paint mileage went up to eight jackets per gallon.

Then we replaced the No. 1 with the Ransburgh No. 2 reciprocating disc. Now we are coating 12 jackets with each gallon of paint.

Paint Line—A 500-ft long conveyor, operating at 6 fpm, carries the 30-gallon heater jackets from the fabrication area. They hang on the line on 30-in. centers.

After a three-stage bath (Oakite No. 89, water rinse and chromic acid), the jackets go through a drier and a blow-off station before entering the electrostatic paint area.

Paint Feed — The conveyor makes a loop around the reciprocating disc atomizer which is mounted overhead. Paint is pumped to the center of the disc (25 in. in diameter) which rotates rapidly to feed enamel to the atomizing edge.

A high, direct-current voltage potential on the disc establishes an electrostatic field between the disc and the electrically grounded jackets on the conveyor.

No Dirt—The electrostatic field atomizes the paint into a fine spray, and it is attracted to the surrounding parts. Since no compressed air is used, we eliminate the dirt and dust problem previously caused by high pressure air blasts.

The reciprocator makes 7½-strokes a minute on the 30-gallon jacket which is 48 in. long. The multiple strokes of the disc permit a uniform coating to be applied in a single loop. The jackets rotate on the conveyor as they move around in the spray area.

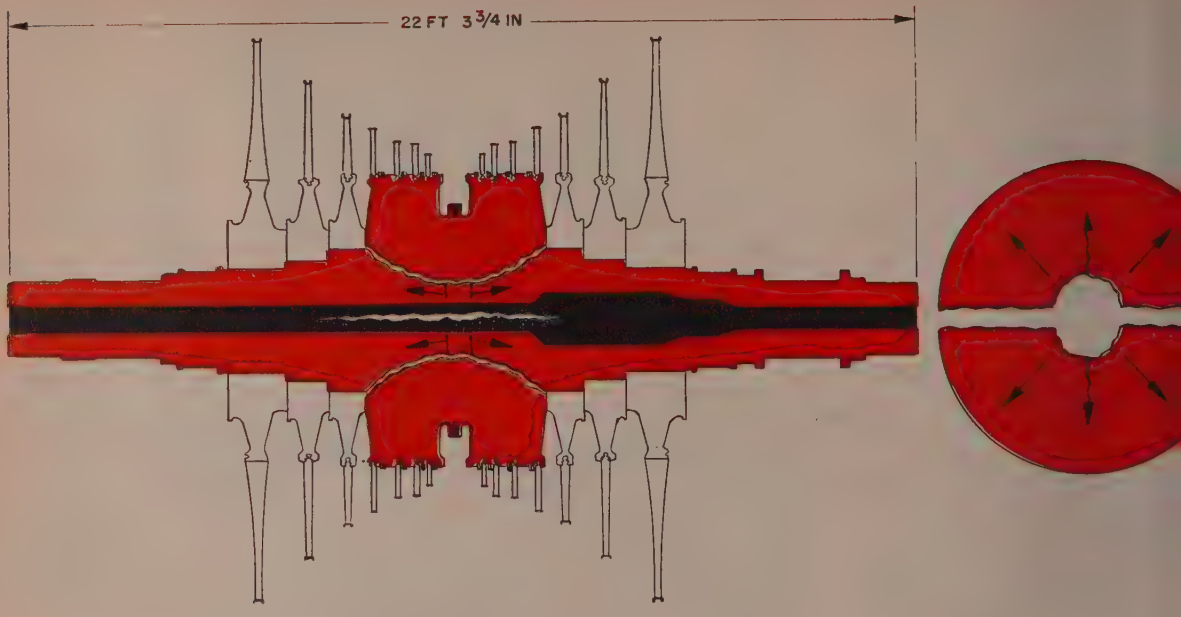
Small Parts — Length of the stroke is adjustable for different size parts. When painting small parts, such as heater doors, we hang as many as 40 pieces on special workholders. In painting the sides for table models, we hang four panels to a fixture. An indexer in the center of the paint area turns the holder 180 degrees, permitting painting of both sides in the single loop.

Hedges water heaters are painted in four colors: White, maroon, black and gray. Color changes are made in minutes.

Daily Schedule — Painting is scheduled according to daily demands in assembly. This minimizes banking of finished parts.

From the paint area, parts move into the infrared ovens where they bake out for 9 minutes at 325°F.

heater doors hang on special olders. Fixtures rotate as the yor makes a loop around the ocating disc



How the spindle split

Why the Forging Failed

"IF WE HAD KNOWN then what we know now, the turbine never would have blown up." That is essentially what Allis-Chalmers told the ASME in its recent report on the disaster that shook Chicago a year ago.

Shortly before midnight on Dec. 19, 1954, a low-pressure turbine spindle shaft let go at Commonwealth Edison Co.'s Richmond station, killing two, injuring five and plunging a large part of the city into darkness. There was no warning. The steam turbine was undergoing a routine overspeed-trip test.

The turbine had been made by Allis-Chalmers Mfg. Co. But in telling about it, that company was speaking for all large turbine and forging makers, who share common problems.

Hydrogen—The finger points directly at hydrogen embrittlement as the cause of failure. Warning signs were visible in 1951 when the forging was made—if anyone had had the wisdom to interpret them. But indications spotted in ultrasonic tests were put down as harmless inclusions and stringers, a reasonable conclusion for the state of testing knowledge a time.

It's a relief to know that ern testing can prevent si disasters: The same fo

Microstructure of typical crack near mid-radius of the forging

r fracture segments reassembled. Note the central conical fractures

ld be rejected today on ultra-
ic evidence. Not long after the
nland turbine was constructed,
s-Chalmers began requiring ul-
onic tests for acceptance of all
ging ingots.

vidence—That hydrogen was to
ne in this case shows up clear-
in the evidence, says Allis-
lmers. Here is how it recon-
cted the picture.

The spindle was conventional, with a central section of large diameter carrying the high pressure blading. The lower pressure blading was carried on rings which were shrink fitted on either side of the central section. Factors of safety conformed to widely accepted standards.

Physicals—The shaft was made of nickel - molybdenum - vanadium steel, with these properties:

Chemical analysis:

Carbon	0.25-0.35 per cent
Nickel	2.50-3.50
Chromium	0.25-0.75
Molybdenum	0.40-0.60
Vanadium	0.05 min

Physical properties:

Tensile strength	105,000 psi
Yield strength (0.02 per cent)	85,000 psi
Elongation in 2 in.	16 per cent longitudinal 12 per cent transverse or radial
Reduction of area	30 per cent longitudinal 23 per cent transverse or radial

Manufacture—The 186-ton ingot was reduced by forging in the ratio of 1.4 to 1 before upsetting, and after forging was given a 470-hour flake or thermal-crack protection cycle. After rough machining and boring, the shaft was normalized and tempered.

Inspection included heat indication, dimensional inspection, sulphur prints, magnetic particle inspection and visual inspection of the bore. Both the forging manufacturer and Allis-Chalmers made ultrasonic inspections, but for information only.

Visual inspection spotted discontinuities in the bore, but they were machined away. Sonic tests showed indications in a neighboring area, but because of the satisfactory visual bore condition, processing was continued. Tests on the completed turbine showed

rogen did this. It isn't likely to happen again

The turbine after the accident

the shaft to be more than usually stable and vibration-free.

Blow-Up—The accident occurred when the central portion of the shaft (between the shrunk-on rings) split into four almost identical quarters. At their bases, the quadrants separated from the shaft by conical fractures extending inward from the fillet at the edge of the innermost ring.

Rupture started in an area of the shaft near the bore which showed an abundance of hydrogen flakes, and progressed by brittle fracture. It definitely did not start at the ring fillet, although that area showed a good-sized crack.

Evidence — Chemical analysis by Battelle Memorial Institute showed a hydrogen content of only about 1 ppm, normally considered satisfactory, but physical tests modified this picture. Low values for elongation and reduction of area near the bore indicated considerable loss in ductility.

Most significant, some test bar fractures showed "fish eyes," bright spots resulting from hydrogen concentration. Test bars from areas of low ductility showed fully restored ductility after baking for two hours at 400°F, indicating that excess hydrogen in the metal had been removed by heating.

Charpy V-notch impact tests indicated a probability of high notch sensitivity and brittle rather ductile failure under condition multiaxial stress.

Fracture Prone—Failure of turbine is the concern of all ers because most standard rials for big turbine spindles generator rotors are notch s tive and capable of brittle fa at normal operating tempera and speeds. Great care mus taken to eliminate notches might lead to brittle fracture

But hydrogen, trapped in s ifying steel, creates hidden r weakness (flakes, thermal cr segregation cracks). These f tend to be oriented radiall cylindrical forgings, and thu be edge-on to sound waves jected from the circumfer Five years ago, that wasn't so understood in ultrasonic testi

Way Out—What's the ans Austenitic steels and nonfe metals that are immune to b failure have been proposed for bine shafts. They've been out for low strength or othe desirable qualities.

The probable solution will from new steel compositions, ter heat treating and impr steelmaking practice espec The process developed by umer Verein AG in Germany vacuum casting ingots looks the best bet at the moment has been used to cast hydr free steel for turbine shafts several years in Europe an about to be introduced in the by National Research Corp. (S Nov. 14, 1955, p. 120).

Along with better materials come better inspection met Coming are sonic techniques searching from the bore outw Most needed are sure-fire met that will distinguish between h less and harmful indications step in that direction is bette derstanding of the roles that tern and distribution of indica play.

• *Extra copies of this article are av in quantities from one to three until s is exhausted. Write Editorial S* STEEL, *Penton Bldg., Cleveland 13,*

WEIGH FIRST COSTS

f CMP restricted specification cold rolled strip steel

True costs of cold rolled strip steel are oftentimes clouded by unfamiliarity of the full potential with a specially tailored product such as CMP processes.

Typical of the reductions in overall manufacturing costs that can often be recorded with the use of CMP restricted specification strip, is the elimination of manual costs involved in the tear-down and re-assembly of components rejected for malfunctioning due to steel dimensional variations. Where precision fitting of components is essential to satisfactory equipment operation, the extra steel cost for close gauge accuracy is more than offset by greater parts production per machine hour and reduction or elimination of rejects at final assembly. Add to this the lower end product cost resulting from longer tool life, fewer coil changes on production equipment and other labor cost items.

The conclusion often is that it pays to buy a premium specification product to lower the cost of an end product employing cold rolled carbon, alloy or stainless strip steel.

CMP

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HIGH CARBON
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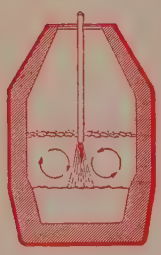


Jones & Laughlin Steel Corp. will install two oxygen blown converters at Aliquippa, Pa. This move by the No. 4 producer is prompting steelmaking management to take another look at the . . .

McLouth Steel

Economics of Oxygen Steelmaking

HOW do the costs of oxygen and open-hearth steelmaking compare?

Some figures were given by George B. McMeans, vice president-operations, Kaiser Steel Corp., at the San Francisco regional technical meeting of American Iron & Steel Institute, last month.

Investment: One-Half—An oxygen converter plant can be built for a capital expenditure of less than half the cost of open-hearth facility of equal capacity, according to Mr. McMeans.

For example, an oxygen shop that turns out 450,000 tons per year can be built for under $10 million. This includes two 35-ton vessels (one operating and one stand-by), all operating equipment, utilities, storage facilities and a system for air pollution control.

An open-hearth shop of only slightly larger capacity (525,000 tons, using 275-ton furnaces) would cost $21 million, said Mr. McMeans.

The capital outlay differential increases if shops of greater capacity are built. He estimated that an oxygen shop for close to a million tons a year could be constructed for about one-third the cost of a comparable open-hearth plant.

For a time, there was considerable concern about air pollution. Kaiser Engineers (it holds U. S. licensing rights on the oxygen process) guarantees that stack emission from an oxygen converter will be no greater than that from a modern open hearth equipped with a precipitator.

Production Costs? — These also favor the oxygen process, acc ing to Mr. McMeans.

Materials used by the ox converter may cost a little m but the difference is less tha per ton.

Savings come in labor, ma nance and other cost items (a $3 a ton, Mr. McMeans said).

How It Works—The conv vessel may be either eccentri concentric—both types are It resembles a bessemer, alth there are no tuyeres, wind bo blast pipe.

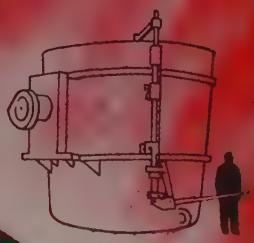
The refractory lining is a

PREDICTION

What is the future of oxygen steelmaking in this country? In an interview with STEEL's editor, Irwin Such, in Zurich, Switzerland, this summer, Werner Schlaepfer, manager, Brassert Oxygen Technik, had this to say:

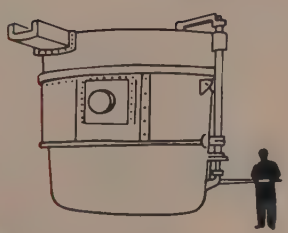
"In the new expansion program in the U. S., at least one-third will be oxygen converter steel. But BOT is not a universal process . . . It's limited to steel with 0.35 max carbon at the moment . . ."

to Build a Better LADLE*



*. . . this 285-ton Pollock Open Hearth Ladle is welded a special positioner designed specifically for jobs like this. The ladle is placed on the rollers and revolved until the ladle in the best possible position for "down-welding." Using the positioner results in better welds. A positioner for a 285-ton ladle is big . . . it has to be. But at Pollock, where thinking is as big as the job itself, huge machines are commonplace.

The William B. Pollock Company prides itself on being able to do the big jobs. It has the skilled men, the resourceful engineers and the special machines (as this positioner) that are needed to turn your biggest drawing board dreams for iron and steel making facilities into solid, practical realities. When you're thinking "big," think of The William B. Pollock Company . . . specialists in all matters and equipment pertaining to the manufacture of iron and steel.



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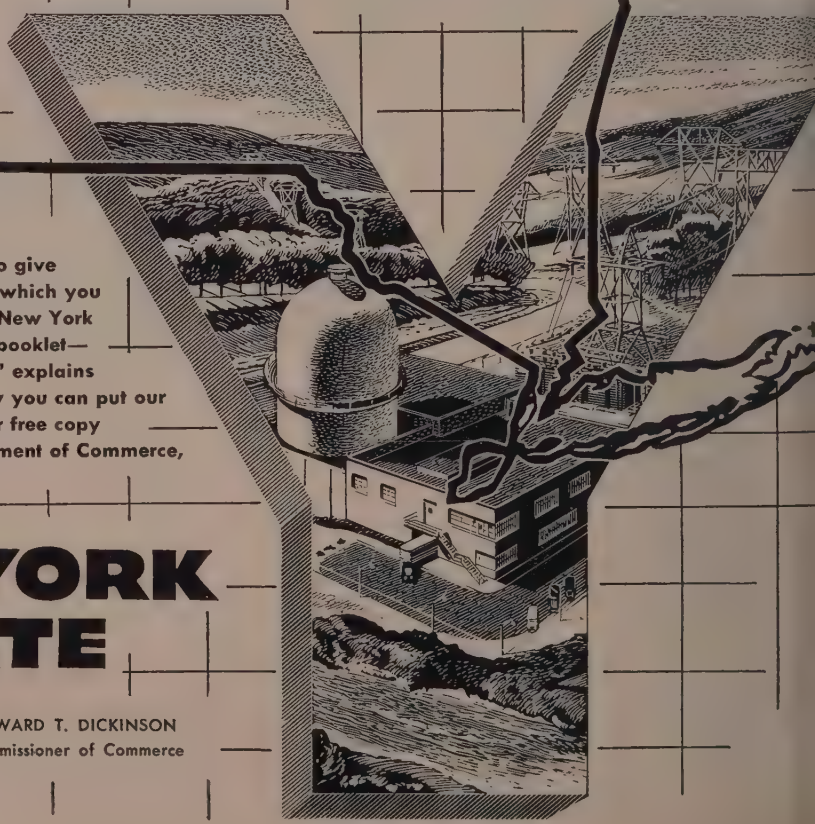

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Commissioner of Commerce

in. thick. At first, it consisted a permanent lining of magite brick and an interior lining pressed tar—dolomite brick h a layer of tar-dolomite been the permanent and interior ngs.

A lining life of 120 heats was rmal. This has been extended about 400 heats per lining by e of burned magnesite brick inad of tar-dolomite. A vessel is continuous production for about days before being taken off for ining.

Ton a Minute — Mr. McMeans ve a yield of 89 per cent as out average. In a 400-ton ves, the blowing period runs from to 22 minutes. This gives a nplete tap-to-tap cycle of been 35 and 40 minutes and ans that a 40-ton vessel will n out between 50 and 60 tons hour.

Oxygen used in the process avges about 2000 cu ft per ton steel.

Start Here—Charging is similar regular converter practice and gins with the vessel being tilted take scrap (about 25 per cent all metal used). Werner laepfer, manager, BOT, Zurich, itzerland, reports that as little 8 per cent scrap can be used. This is followed by hot metal d small quantities of roll scale d lime.

The vessel then goes upright d a water-cooled oxygen lance is vered to between 2 to 3 ft above e surface of the bath. Oxygen turned on—pressure is about 100 150 psi.

An immediate reaction starts. n oxide (FeO) is formed—part es into the slag and some difses into the bath. A vigorous bon monoxide boil reaches all rts of the charge. This helps x the FeO with the bath.

High Temperature—In the cenl reaction zone, temperatures close to the boiling point of n. This enhances the solubility oxygen and accelerates the difion rate of FeO throughout the th. The converter takes out 50 60 per cent of the sulphur, ich is expelled as sulphur dioxe.

A slag high in FeO is formed over the surface of the bath, which acts as a seal. The carbon reaction speedily diminishes the FeO content of the slag.

A drop in the flame at the vessel mouth shows that the process is finished. At this point the oxygen lance is withdrawn. The vessel is tilted to the horizontal and slag is skimmed off. Then it is tipped another 10 degrees to pour the metal into a regular ladle.

Clean Steel — Continuation of boiling to the last minute of the refining period prevents overoxidation. It does away with the need for deoxidation with its pickup of impurities in the ladle. The vigorous boiling action coming from extreme fluidity of the molten steel results in less gas being retained in the ingot—the center and bottom parts of the ingot always have excellent density. These were reasons given by Mr. McMeans for the high degree of purity of oxygen steel.

While the hot formability of oxygen steel compares well with open-hearth product, its cold working properties are better. High ductility makes it especially suited to the manufacture of cold drawn wire and cold rolled strip and sheets.

According to Mr. McMeans, oxygen converter steel never shows any trace of pickle blisters even under the most severe conditions —more proof of its high purity.

Future—When it comes to high-carbon steels and some of the specialized alloys, Mr. McMeans said that we will have to rely upon the open hearth and electric furnaces. Here's the way he put it: "The oxygen process is not ready to replace the open-hearth — complement it, yes; but supplant it, no —at least not for a long while."

The oxygen process will stimulate work on new hot metal processes. Because of its low-cost features, it's a natural for the small nonintegrated steel plant. Yet it cannot be used due to the hot metal requirement.

Mr. McMeans predicts we will soon see companion evolutionary developments in hot metal refining to eliminate blast furnace and coke oven facilities. "This may take the form of direct reduction, continuous cupola or even some entirely new approach—but it will come," he says.

In steelmaking . . .

Research Keeps Technology Alive

Electron microscope probes metal structures at 50,000 magnifications

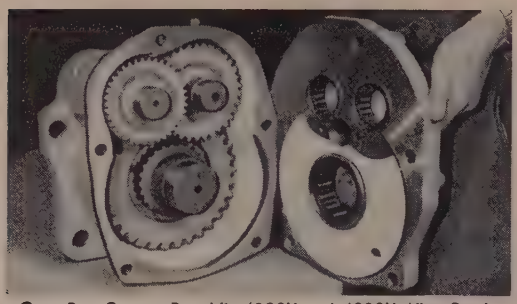
"I KNOW of no industrial research organization in the country that does not plan continued expansion. We certainly do."

Those words were used by Dr. Howard S. Turner, vice president-research and development, Jones & Laughlin Steel Corp., at the dedication of the corporation's Graham laboratory in Pittsburgh.

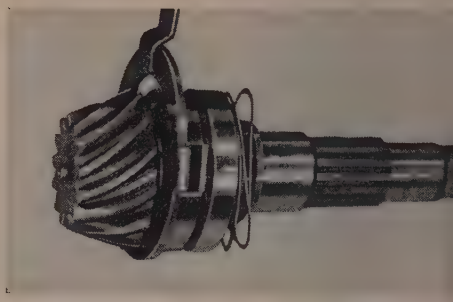
Dr. Turner said that J & L, in the main, will expand its research of basic processes — preparation and processing of raw materials, smelting and refining.

Upgraded Ores — Reduced reserves of high quality ores have required enormous processing installations to turn out the quality of ferrous raw materials needed

How you can put hundreds

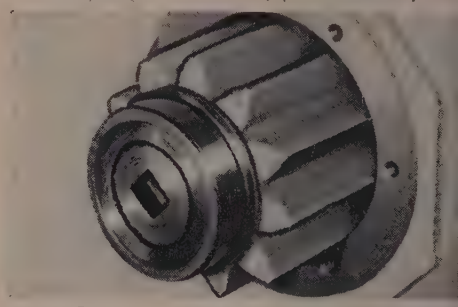


Gear Box Gears—Republic 4320H and 4820H Alloy Steels



Transfer Case Pinion—Republic 4820H Alloy Stee

Transfer Case Ring Gear—Republic 4820H Alloy Steel



Final Drive Pinion—Republic 4820H Alloy Steel

orsepower to work with safety

Tourneau-Westinghouse does it with the help public Alloy Steels on the Model B Tourna- This high-speed, self-propelled scraper is ned to carry 23 yards of earth at speeds up miles per hour.

ublic Alloy Steels are used in this giant for drive pinions, transfer case ring gear and n, gear reduction box gears and pinions, and ic motor pinions.

oy steels provide an outstanding combina- of qualities essential to safety in designing ment to carry heavier loads at higher speeds. ese fine steels you will find highest strength s—plus an unusually high strength-to-weight ratio that permits transmission of hundreds of horsepower through tough, strong gears and shafts free from excessive weight.

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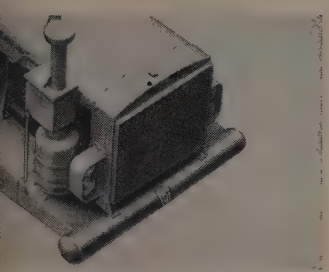
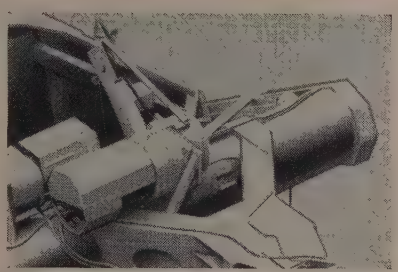
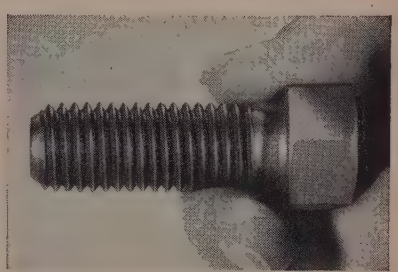


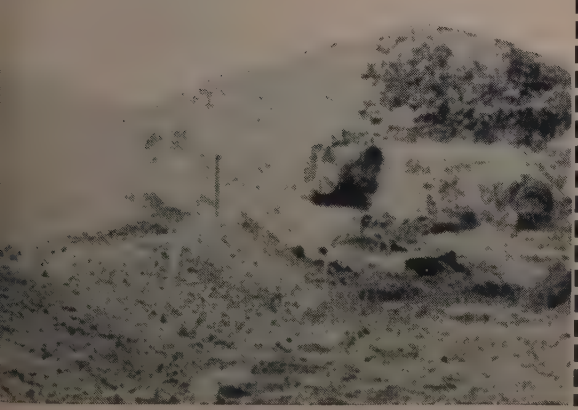
ER REPUBLIC PRODUCT, Electric Resistance Steel Pipe, is used for the front bumper on del B Tournapull. Both this type and Con- Butt Weld Steel Pipe have been serving y for years in all types of applications. they are better than ever. They have mechanical applications, like the one above, in addition to being used for ission of gas, water, steam.



PINS, BRACES AND REINFORCEMENTS on the Model B Tournapull are made from Republic Hot Rolled Carbon Bars. Countless forging and general manufacturing companies look to Republic as a dependable source for hot rolled steel bars. Rounds, squares, hexagons, octagons and flats are produced in all grades of carbon, alloy and stainless steels. Republic also supplies hot rolled special sections for economical mass production of steel parts.



REPUBLIC COLD FINISHED CARBON BARS are used by LeTourneau-Westinghouse for cap screws and bolts. Cold drawing gives steel parts higher strength, greater uniformity and a bright, smooth finish. Republic's Union Drawn Division supplies high-quality cold finished bars in all standard and special carbon, alloy and stainless analyses. And to get the most out of these steels, Republic offers you the services of expert metallurgists and machining specialists.



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for the blast furnace. J & L pioneered with the first large-scale beneficiation of lean iron ore in this country, Dr. Turner stated, adding:

"But new technologies demand our attention as the pressure for upgrading these raw materials grows. We will certainly see more great advances in the future."

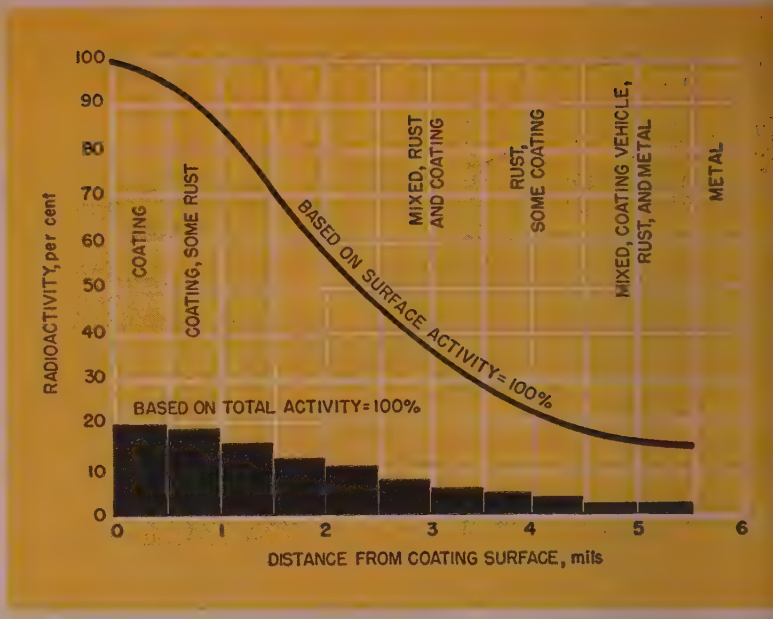
Change in Coke—He predicted: Some day, the conventional coke oven may give way to a continuous process to provide the carbonaceous feed for the blast furnace. This will match the parallel processing of ores by enhancing control of the size and quality of the blast furnace burden.

One of the steel industry's aims in processing, according to Dr. Turner, is to gain a better understanding of mass and heat flow . . . and reaction kinetics in the kilns, shafts and vessels in which raw materials are converted to steel.

Translate—To put the increased knowledge of our processes to full use, it is essential that we learn to adapt research data to the massive installations in our plants, Dr. Turner explained. "Probably no single factor restricts the application of new basic knowledge so much."

Many advances in processing have been in larger and larger pieces of equipment. This has led to something of a financial dilemma, Dr. Turner pointed out. There is less opportunity for the incremental addition to capacity. Expansion must be in relatively enormous bites if it is to be economical. The appetite for capital in the steel industry is tremendous by any measure, but it would be more manageable if it were possible for us to reduce the size of our fully economic units of processing, he believes.

Keep Competitive—He summed up: "With no let up in the technical effort, we are aiming toward our customer needs, we expect to broaden and intensify research directed toward cost and quality improvement in our basic processing steps. We see this as essential, since the steel industry is under heavy competitive pressure not only within its own family, but from without—from lighter metals and plastics."



Composite curve of four test specimens shows the penetration into the rust la of the radioactive vehicle component of the primer coating. Per cent of ra activity in each 0.5 mil layer is given in the bar graph

Radioactive Tracing Bares Rust

A MANUFACTURER of protective coatings wanted to prove that his product penetrated to bare metal when applied over rusted surfaces.

He turned the problem over to technologists at Battelle Memorial Institute who came up with the means—radioactive tracing. A constituent of the fish-oil-based coating was made radioactive and then traced down to the bare metal.

How—First, it was necessary to identify one or more of the major chemical constituents of the primer coating and determine which constituent would be most suitable for radio tracer synthesis studies.

Technologists found that glycerol in the form of triglycerides was a major constituent of the coating and common to all fish oils.

Radioactivated — Glycerol was synthesized, using radioactive carbon-14. The glycerol portion of the fish oil was then replaced with the C^{14}-labeled glycerol.

The reconstituted fish oil was tested to make sure it was identical with the original oil. It was then processed by the manufacturer (Rust-Oleum Corp., Evanston, Ill.) into a radioactive coating equ lent to the standard product.

Final Tests—Seven badly ru steel test panels were prepare conformance with the coa manufacturer's standard di tions for application. The ra active primer was then brushe directly over the rusted surf and allowed to dry for two we

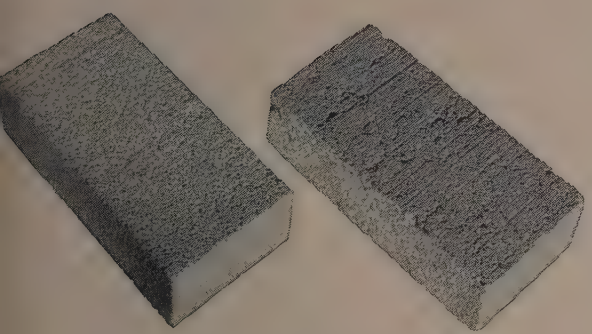
Following this period, the c ed panels were put in a lap fixture that made possible trolled removal of the surface l using crocus cloth. The sur was lapped at 0.5 mil levels d to the bare metal and the radi tivity measured at each leve Geiger-Mueller tube and gas- proportional counter.

Results—The protective coa penetrated through the rust; a 15 per cent of the surface ra activity was found at bare m The coating pigment and fish vehicle combined penetrated about 4.5 mils in depth.

Results also show the unu affinity which fish oil has for Radioactivity was recorded where rust had formed in deep or pockets in the metal.

Cork Burn-Out...

increases strength and lengthens life of Armstrong Insulating Fire Brick

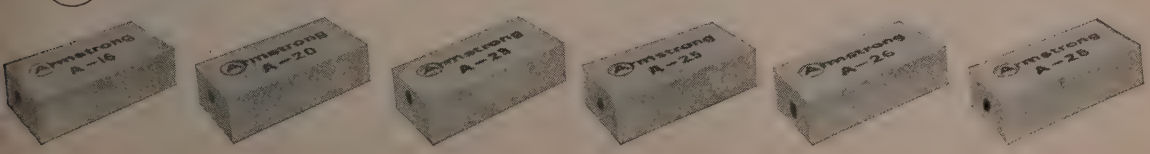


Fine-grained, even texture of Armstrong Insulating Fire Brick on left gives brick high insulating value.

When brick are fired, cork particles burn out slowly and evenly, eliminating laminations and internal strain. The result of this exclusive Armstrong process is a strong, durable brick, easy to handle and requiring less frequent replacement in service. Cork burn-out allows this extra strength to be obtained without sacrifice in insulating efficiency.

Write for free booklet giving full information on the entire line of Armstrong Insulating Refractories. Address Armstrong Cork Company, 2711 Reed Avenue, Lancaster, Pennsylvania. If you have a problem involving the use of insulating refractories, call in your Armstrong Engineer for expert assistance.

Armstrong INSULATING REFRACTORIES



Heat Treating Ductile Iron

PART I

By Dr. ROBERT E. SAVAGE
Metallurgist, Development and Research Division
International Nickel Co. Inc.
New York

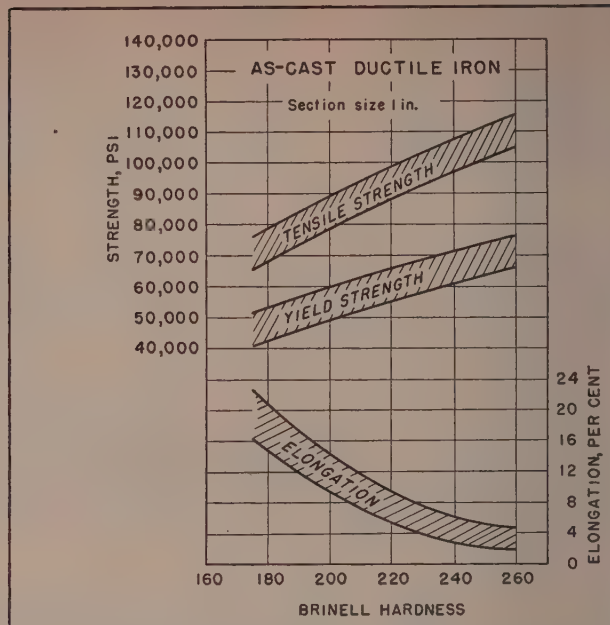


Fig. 1—Range of mechanical properties of sound, carbide-free castings in the as-cast condition

A DUCTILE IRON casting can be heat treated to a remarkable range of mechanical properties. They vary from 60,000 to 200,000 psi tensile strength, with up to 25 per cent elongation.

Heat treatments commercially used on ductile iron are stress relief, softening (annealing), hardening (normalizing, quenching, austempering and martempering, all followed by tempering) and surface hardening (induction or flame hardening).

This article will deal with stress relief and softening heat treatments, Part II, to appear next week, will cover hardening and surface hardening.

Mechanical Properties — Ductile iron, also called nodular iron, is a cast iron with the graphite substantially in spheroidal form. Its wide variation in mechanical properties is influenced primarily by heat treatment and secondarily by chemical composition.

Ductile iron is a family of magnesium-containing cast irons which may have wide variations in chemical composition. Most commercial castings with which this article deals fall within the range of:

Total carbon—3.0-4.0 per cent
Silicon—2.0-3.0 per cent
Manganese—0.2-1.0 per cent
Phosphorus—0.1 maximum
Sulphur—0.02 maximum
Nickel—0.0-3.0 per cent
Iron—87.0 per cent minimum

Alloying Elements—Ductile iron must contain small percentages of magnesium. In ordinary foundry practice 0.05 per cent will produce spheroidal graphite.

Castings vary in weight from several ounces to 50 tons, with sections ranging from ⅛ to 48 in. Alloying elements, such as nickel and molybdenum, are added to impart hardenability or otherwise improve properties.

Carbon Content—The distribution of total carbon content in ductile iron is the main factor influencing its mechanical properties. Carbon is essentially present as uncombined carbon (spheroidal graphite), but the iron may contain some combined carbon in the iron matrix (massive carbide, pearlite or martensite).

The proportion of uncombined carbon to combined carbon may be accurately controlled by heat treatment to produce Brinell hardnesses from 140 to 600. In most cases, the control is a reversible process; the same casting may be softened for ease of machinability and then hardened for higher m chanical properties and improv wear resistance.

Steel-Like Matrix—Think of du tile iron as a material containi spheroidal graphite in a steel-li matrix. The matrix consists of iron phase rich in silicon and ma ganese. Part of the total carb will diffuse reversibly with a sp cific heat treatment from t spheroidal graphite to the matr or vice versa.

You can heat treat ductile ir by all conventional methods us to heat treat steel to produce steel-like matrix of low or hi carbon content (ferrite, pearli martensite or combinations these) with the graphite retaini its spheroidal form. In gener alloying elements which impa hardenability to steel do the sa for ductile iron.

As-Cast—Properties and micr structure of ductile iron as cast w vary with its section size, since affects the cooling rates. Aft proper heat treatment, the matr structure will be independent section size.

Typical properties of as-cast du tile iron are: Tensile strengt 80,000 to 110,000 psi; yiel strength, 60,000 to 75,000 ps

gation, 3 to 10 per cent in 2
Brinell hardness, 200 to 270;
rpy impact unnotched, 15 to
t-lb.

ection Size — All ductile iron
ings will contain spheroidal
hite. However, the matrix
vary gradually from partially
idic with pearlite in light sec-
s (less than about ¼-in.),
ugh pearlitic in moderate sec-
s (¼ to ¾-in.), to pearlitic-
itic mixtures and finally fer-
in heavier sections (¾-in.
over).

is possible to have combina-
s of these microconstituents in
asting of varying section size.
s not possible to give definite
ion sizes where these changes
ur, since chemical composition
uences the matrix as well as
r foundry treatment.

hemistry—Ferrite forming ele-
nts, such as silicon, promote
ite in the lighter sections and
ease the tendency to form car-
and pearlite. On the other
d, pearlite or carbide forming
ments, such as manganese, pro-
e pearlite or carbide in the
ter sections and decrease the
dency to form ferrite. One ele-
t, nickel, does not fall into
er category since it promotes
rlite and decreases the ten-
cy to form both carbide and
ite.

hus, the mechanical properties
as-cast ductile iron in various
ions may be controlled by its
mistry.

roperties — The range of me-
nical properties of sound, car-
e-free castings in the as-cast
dition are shown in Fig. 1. A
nite relationship exists be-
en tensile strength, elongation
hardness of as-cast ductile
. (The ratio of tensile strength
Brinell hardness is about 420:1.) This means that a simple hardness measurement on a casting will give a reasonable indication of mechanical properties, providing the casting is sound and free of primary carbide.

Stress Relief—Heat treatment of ductile iron for stress relief does not materially affect its microstructure or mechanical properties. It will remove any residual stresses in the casting caused by the casting process.

All complex engineering castings should be given a stress relief heat treatment.

Castings may be stress relieved at temperatures from 1000 to 1250°F. They should be held at temperature for 1 hour, plus 1 additional hour for each inch of section thickness.

Time-Temperature — The cooling rate from the stress relief temperature will not affect the microstructure or the mechanical properties. However, it may affect the retention of residual stresses in the casting and should be carried out at a slow rate to prevent setting up such stresses.

It is good practice to cool the casting in the furnace to about 700°F; however, the complexity of the casting is the controlling consideration in the determination of cooling rates (Fig. 2).

Softening—The annealing treatment for ductile iron castings consists of: 1. Heating into the austenitizing temperature range to permit the carbon to go into solution and to break down carbides if they are present. 2. Cooling at a slow rate through or holding just below the lower critical temperature range to transform the austenite to ferrite and spheroidal graphite.

The critical temperature for ductile iron depends on its chemical composition. Factors influencing annealing are chemical composition, including alloy content, section size and rate of cooling.

Typical mechanical properties obtained by annealing are: Tensile strength, 60,000 to 80,000 psi; yield strength, 45,000 to 60,000 psi; elongation, 10 to 25 per cent in 2 in.; Brinell hardness, 140 to 200; Charpy impact unnotched, 60 to 115 ft-lb.

Chemical Effects — Manganese and phosphorus contents of ductile iron should be as low as possible if annealed properties are desired. Alloying elements, such as chromium, nickel and molybdenum, retard the annealing cycle and should be held to a minimum or the cycle adjusted to compensate for their effects. Higher silicon content promotes ease of annealing at the expense of lowering the elongation and impact resistance.

Annealing Cycle — Ductile iron castings may be annealed in one of the following ways:

1. Heat to 1650°F for 1 hour, plus 1 additional hour for each inch of section thickness. Cool to 1275°F (slightly below the lower critical temperature) and hold 5 hours, plus 1 hour for each inch of section thickness. Cool in any convenient manner to room temperature. This treatment requires close control of the 1275°F hold, so that the pearlite will transform to ferrite and spheroidal graphite.

2. Heat to 1650°F and hold for 1 hour, plus 1 additional hour for each inch of section thickness. Furnace cool to 1200°F controlling the cooling rate between 1450°F and 1200°F to a maximum of 35°F an hour. Cool to room temperature.

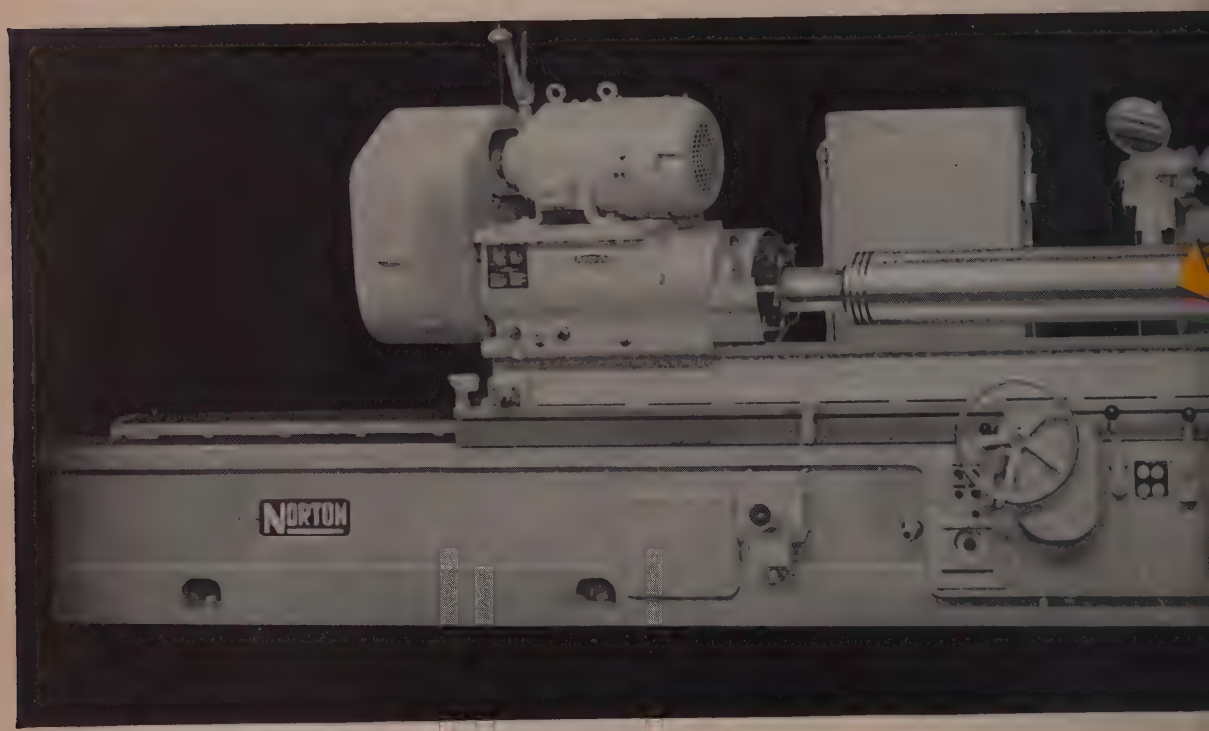
3. Heat to 1300°F for 5 hours, plus 1 additional hour for each inch of section thickness, furnace cool to 1100°F, then cool to room temperature at any convenient rate. This short annealing cycle may be used when the sole objective is to ferritide the matrix. Improved impact resistance is developed with full two-temperature stage annealing.

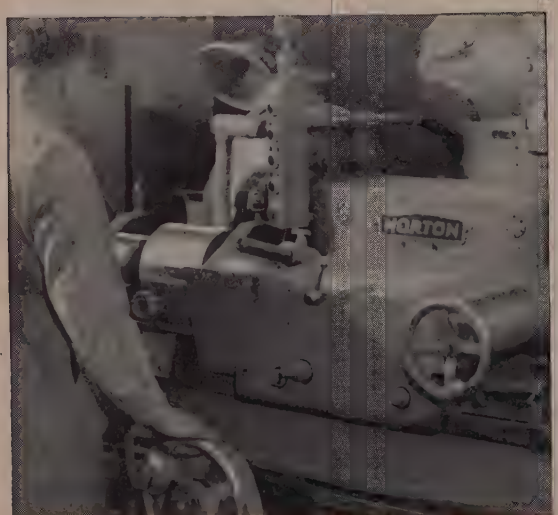
ess Relief mperature (°F)	Time (hours)	Tensile Strength (psi)	Yield Strength (psi)	Elongation (per cent)	Brinell Hardness
As-cast	-	97,500	70,500	8.0	223
1000	8	96,500	66,000	7.0	217
1150	8	88,500	64,000	10.0	197
1200	8	75,500	59,000	11.5	183
1250	8	72,000	56,500	16.0	163

2—Effect of stress relief temperature on the mechanical properties of as-ductile iron bars of 1-in. section. Chemical composition is 3.42 per cent on and 2.52 per cent silicon

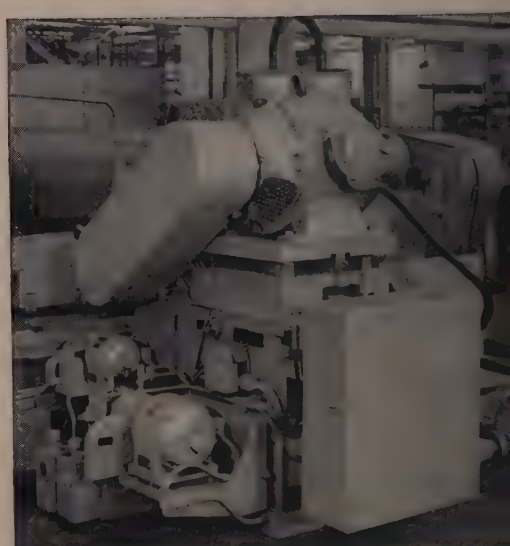
• *Extra copies of this article are available in quantities from one to three until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, O.*

Here's a heavy duty grinder





Easy To Set Up And Operate. All controls in front for minimum set-up time, quick change-over and no reaching by operator. Graduated wheel hand feed indicates feed. "Click-counter" signals adjustment for each .0001" reduction in work diameter. Table-truing and grinding speeds may be pre-set, and obtained by selector lever.



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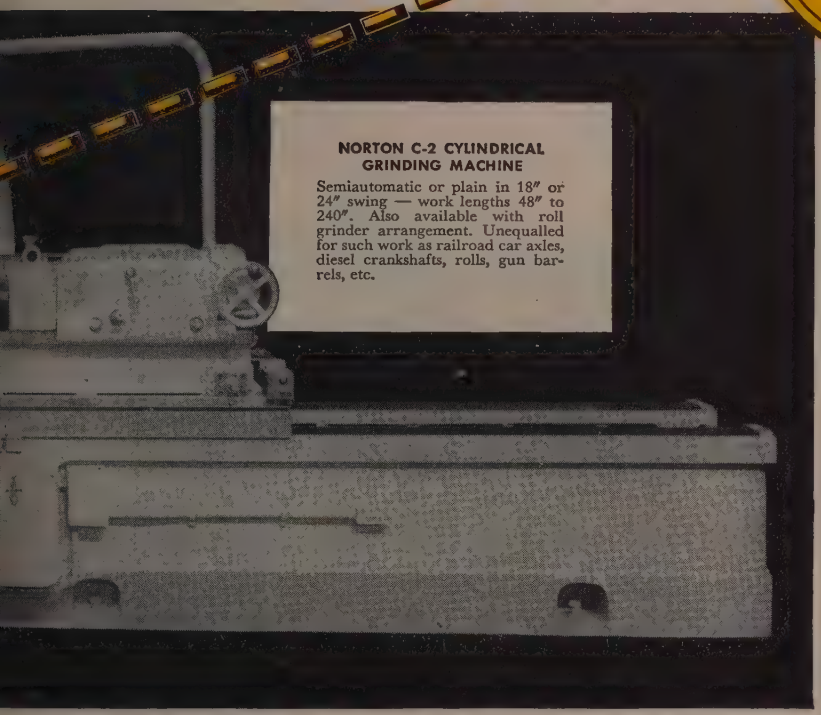
NORTON C-2 CYLINDRICAL GRINDING MACHINE
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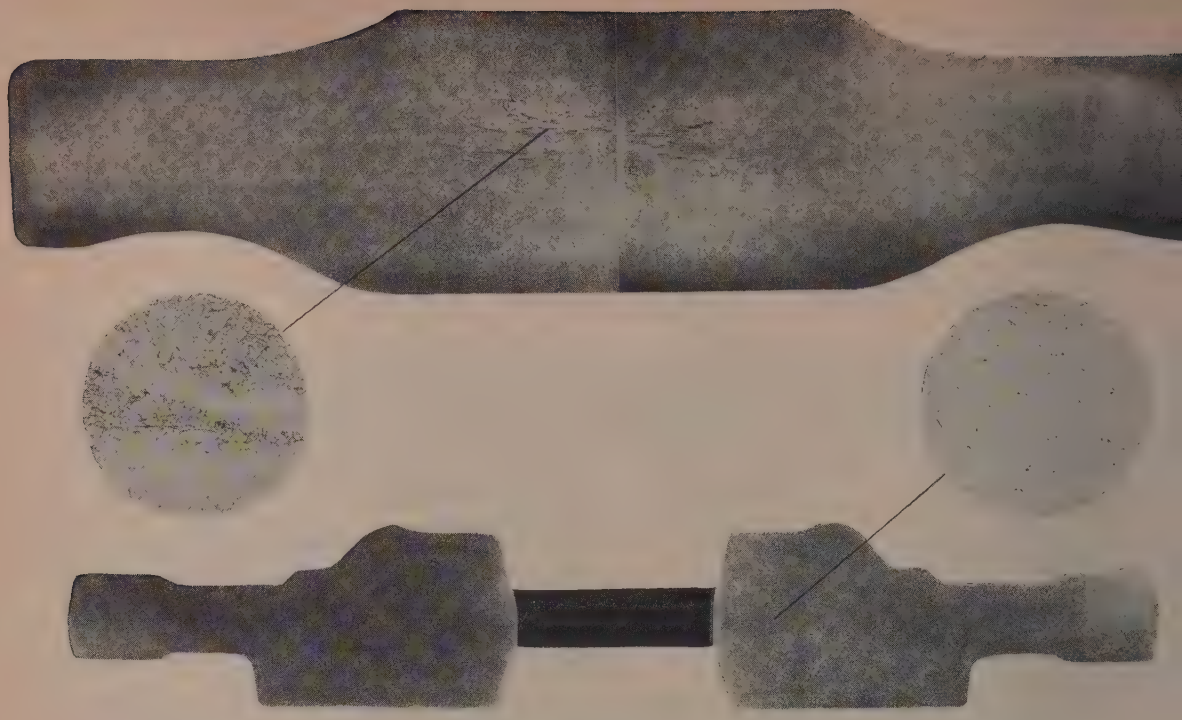


Jet turbine wheel forgings made from 9-in.-square billets of alloy A-286. (Top) Air arc melted material; macroetched section shows center segregation. (Bottom) Vacuum consumable electrode billet; section is segregation free

New Refinement Boosts Vacuum Meta

YOU can get all the vacuum melted metals you need even if there were a spurt in demand.

The last few months have seen several companies announce production facilities for vacuum melting. Just recently Allegheny Ludlum Steel Corp. had its say: "We can make ten times as much high quality superalloys, tool steels or stainless steel in our new vacuum melting department as industry is now using per month. It's designed so it can be rapidly expanded to four times the present size."

Figures—In pounds, Allegheny Ludlum can turn out 250,000 lb of metal per month. This can be increased to 1 million lb per month on short notice.

"One of the main considerations for a customer who needs substantial quantities of high quality superalloys has been availability," says W. B. Pierce, Allegheny's vice president and technical director. "Recognizing this as a basic problem, our company has sufficient capacity to take care of substantial long-term customer commitments."

Different—Most vacuum melting is done by the induction method. Allegheny Ludlum is using a consumable electrode process—probably the first time it has been applied outside the titanium, zirconium and molybdenum fields. Some modifications were necessary.

Here's how it works: Electrodes of the alloy are cast from a production size, electric furnace air melt. They are arc melted under vacuum, using a water-cooled copper crucible.

Vacuum melted ingots up t in. in diameter (weighing 100 have been made from nickel- superalloys. Ingots up to 16 i diameter (weighing 2000 lb) been turned out in iron-base su alloys, stainless and other st The company says it soon wil melting ingots weighing up to lb.

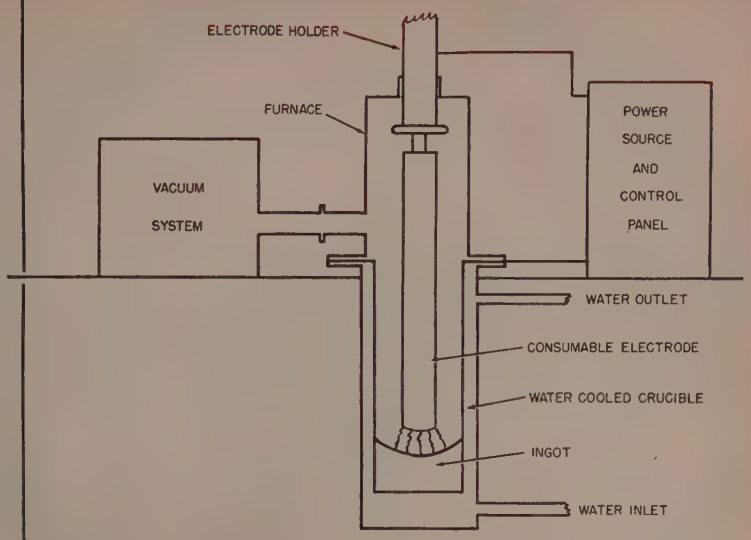
Takes Away Gas—A big re for vacuum remelting is to alloys properties that cannot reached in air melted mate One is lower gas content.

In the consummable elect process, gas bubbles form in molten metal around the arc. T eventually burst and the gases pulled out by the vacuum.

Also, gases are withdrawn f

Consumable electrode vacuum melted metal vs. air melted

1. A higher degree of cleanliness because nonmetallic inclusions and gases are removed
2. Homogeneity is better due to freedom from segregation
3. Improved workability and ingot soundness give user increased yield of product
4. Mechanical properties are better



Consumable electrode vacuum melting furnace used at Allegheny Ludlum Steel Corp. Electrodes of alloy to be processed are cast from air-melt electric furnace, then arc remelted under vacuum

aller metal droplets on transfer
om the electrode to the molten
ol without bubble formation.
e high ratio of surface area to
lume makes removal easy.
Chemical analyses of alloys M-
2, Waspaloy and A-286 for hy-
ogen, oxygen and nitrogen after
cuum remelting show gas con-
nt about the same as for induc-
n vacuum melted metal.

Cleanliness Better — Nickel-base
d iron-base alloys containing
anium are difficult to melt clean-
in air. The main problem
formation of titanium oxides,
rides or carbonitrides which
ow up in finished bars or billets
stringers.
Vacuum processing benefits al-
s such as M-252, Waspaloy and
titanium - bearing stainless
ade, 321. Improvement also
ows up in cleanliness of low-al-
, high-speed and other stainless
ades.
Freedom from stringers and
ner inclusions gives better hot
d cold forming properties. Air
lted material may crack on
astic upsetting, while vacuum
terial does not. Such tearing,
e to stringers, limits the amount of cold or hot reduction that can be used and may require grinding during intermediate stages of a forging cycle. Sometimes bars or billets must be rough turned before starting forming operations.

Mechanism—How does this vacuum cleaning up process work? Here's the way it is explained by W. W. Dyrkacz, Allegheny Ludlum's associate director of research in charge of high temperature alloys and valve steels:

1. Unstable oxides and compounds are dissociated under the low pressure and high temperature used. Arc temperature is estimated to be over 6000°F—more than twice that reached in induction vacuum melting.

2. More stable compounds, such as titanium nitrides, which have a lower specific gravity than the melt, are removed by levitation or floating out.

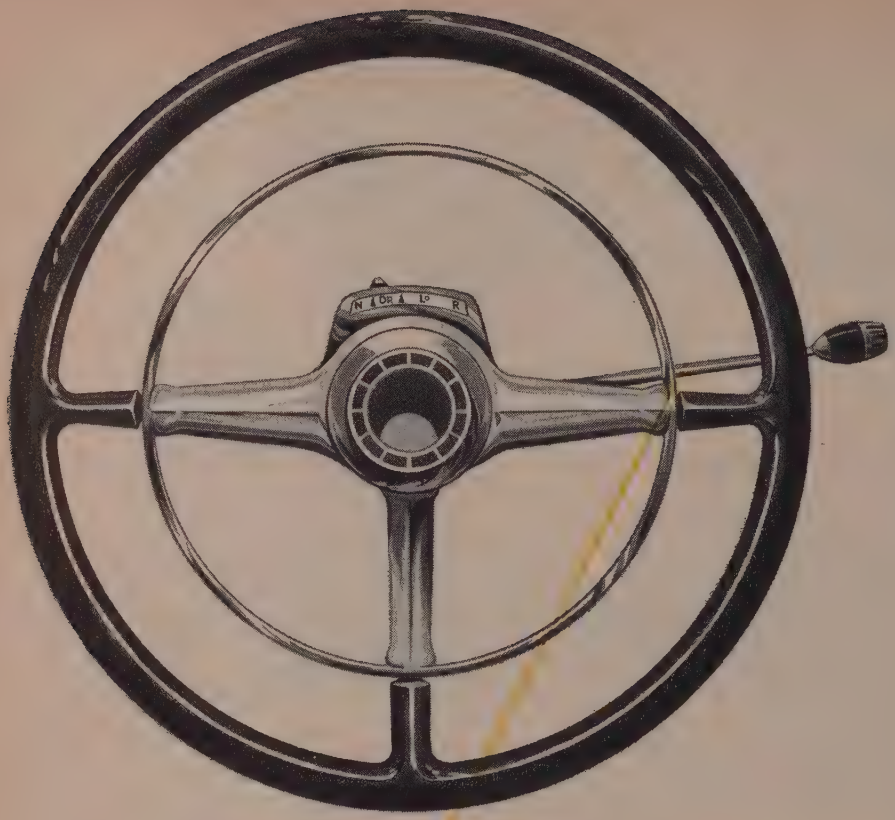
Better Tensile—In a number of uses for high temperature alloys (gas turbine wheels are one), high tensile ductilities are required in the center of the part. This depends on cleanliness and segregation in the center of large billet stock used to make them. In turbine wheel alloys (such as A-286) experience shows that center ductility goes down as the amount of segregation increases — getting worse as ingot size goes up.

This problem is minimized—in fact, virtually eliminated—by consummable electrode vacuum melting. Reason: The fast cooling and close control of solidification rates that cold mold-arc melting makes possible.

Other Properties Better, Too—Hot tensile and stress rupture ductility are improved in alloy M-252 by vacuum remelting. Also, a 15 per cent improvement in the 1500° F fatigue strength has been reported.

The endurance limit at 1200°F of air melted A-286 varies between 37,000 and 47,000 psi. Consummable electrode melted material gives an endurance limit of 47,000 psi.

This can be increased to over 55,000 psi by raising titanium content above the A-286 limit and modifying the heat treatment. The higher titanium A-286 would be hard to make from air melted ingots because of hot workability and other segregation problems.



How a shift in gears save $256,000

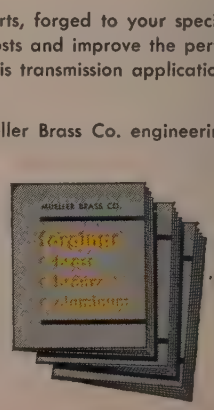
Five million MUELLER BRASS CO. forged ring gears improve automatic transmission operation . . . at lower cost to the manufacturer.

Ever since one of the leading manufacturers of automotive transmissions began using ring gears forged from Mueller Brass Co. bearing bronze, production costs have been cut nearly $256,000. That's because the rough forging weighs less and is closer to finished size than a sand cast ring gear formerly used. This shift in gears resulted in a savings in metal costs, greatly reduced machining time and increased tool life. In addition, the use of forged gears has cut scrap loss and eliminated costly inspection rejects.

The performance of these forged ring gears is also far superior to the sand cast gear, which had a tendency to flake away and crack around the teeth, causing failures. More than five million forged ring gears have now been used in these transmissions without a single failure. Being porous, the sand casting was difficult to balance, but the forging has a dense, homogeneous structure that helps keep it in perfect balance.

Strong, long-wearing non-ferrous metal parts, forged to your specifications by Mueller Brass Co., can help reduce your costs and improve the performance of your products just as they have done in this transmission application. For complete information, write us today.

Write today for your complete set of Mueller Brass Co. engineering manuals.



MUELLER BRASS CO. PORT HURON 19, MICHIGAN

ynamic Braking Increases Brake Lining Life on Overhead anes

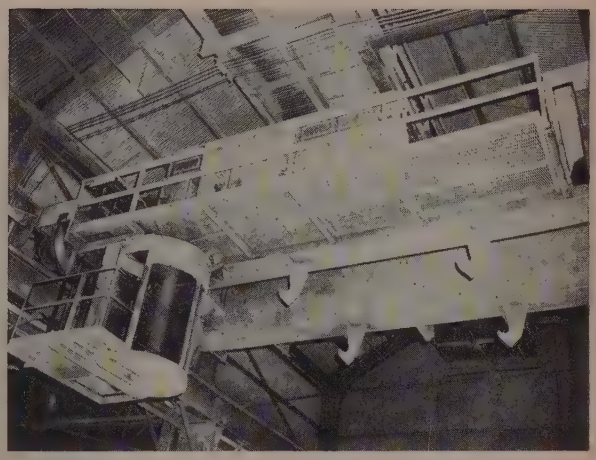
ynamic braking controllers at the Aluminum Co. America plant in Point Comfort, Tex., have prac-lly eliminated lining wear.

ontrollers provide electrical braking by separately iting the series field of the drive motor to posi-ly decelerate the crane.

limit switch under the foot brake pedal applies braking.

hen the operator wishes to stop his crane, a ht depressing of the brake pedal closes the limit tch and applies dynamic braking to absorb initial mentum. Additional pressure on the pedal actu-s the standard foot brake.

verhead traveling cranes equipped with dynamic king were installed at Alcoa's plant in 1949. ne of the brake lining has needed replacement. he cranes move heavy pots of molten aluminum average distance of about 500 ft at high speed. ecent examination of the original linings showed ar averaged 1/16-in. Three times that much is per-



missible before replacement is necessary. *Write*: Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, O. *Phone*: Utah 1-6100

utomatic Sequence Programming Gives Increased Lathe ersatility

ith the numerical sequence programmer, many narch lathes can produce precision pieces in vol-e in fully automatic work cycles.

he key unit is the electronic control panel. It has ple, push-type selectors to preset operations. Once proper sequence is programmed with the selectors, start button sets in motion up to five automatic rk cycles, using as many as five spindle speeds and feed rates. Any number of identical workpieces y be turned in succession without further adjust-nt of the control panel.

perating with the electronic control panel is an log-to-digital converter which controls carriage tion of the machine. The converter sends electrical ulses to the control circuits at precise points in automatic work cycles, actuating the lathe to per-m the operations called for by the panel selectors.

hanging the programmer to a completely different uence of operations is fast and easy: Merely reset control panel selectors.

elector setting can be changed manually; a master rd, which will simultaneously depress the required ectors when placed in contact with the control el, can be used; or punched cards computed by the

plant methods department can be slipped over the selectors to show, through the punched holes, the exact pattern to be set for an operation.

The air gage tracer used with the programmer has a dual template system. Tracer control is provided for the last rough and final finish cuts. *Write*: Monarch Machine Tool Co., Sidney, O. *Phone*: 2-1381

NEW PRODUCTS and equipment

Surface Grinders

A new precision crossfeed screw and ball bearing saddle ways makes for smoother, more precise saddle traverse adjustment.

Ball bearings roll in square channels; table rocking and excessive wear are eliminated. The preloaded bearings are packed in grease for lifetime lubrication.

The saddle feed screw is pre-

cision ground and has a backlash take-up nut. *Write*: Abrasive Machine Tool Co., East Providence, R. I. *Phone*: East Providence 1-0549

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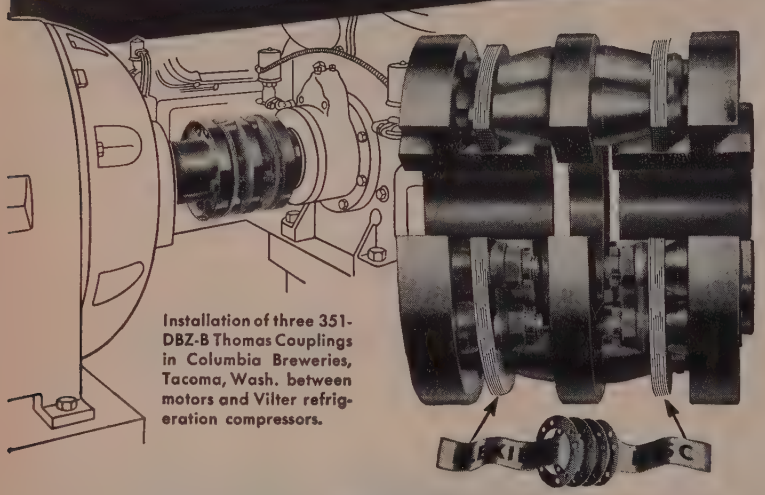
for more years of better service!



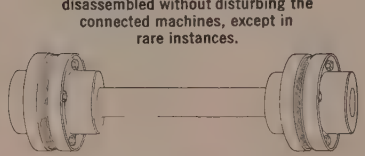
Installation of three 351-DBZ-B Thomas Couplings in Columbia Breweries, Tacoma, Wash. between motors and Vilter refrigeration compressors.

Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.

Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.



THOMAS

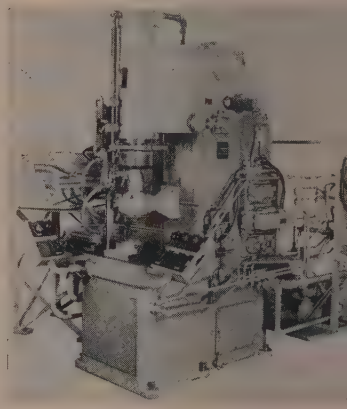
Write for our new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING COMPANY
Largest Exclusive Coupling Manufacturer in the World
WARREN, PENNSYLVANIA, U.S.A.

25-Ton Press

This electrically controlled pr automatically assembles and sta the drive flange of an autom transmission to a pinion gear. then assembles a bushing into gear.

The machine has a special w base, a hydraulic assembly cy der, hydraulic loader and hop feed. In assembly, a spiral and nut guides the flange to helical spline teeth of the gear.



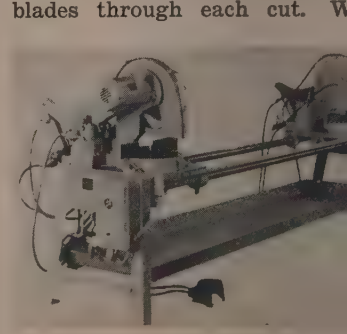
Tooling includes a helical sp locater and hardened and gro staking tools mounted on the nose piece. The complete cycle assembly of a piece is about seconds. *Write*: American Br & Machine Co., 415 W. Huron Ann Arbor, Mich. *Phone*: mandy 2-5621

Double Cutting Machi

Lengths from 22 to 102 in. cut. The machine uses saw bl for nonferrous metals, abra cutoff wheels for ferrous meta

Two semi-independent heads simultaneously. They can be tioned to make 90 degree cut will cut at any angle up t degrees in either direction.

Oil mist sprays lubricate blades through each cut.



ts are finished, the saw blades ract automatically into guards, d the operator removes the cut tion.

The machine is powered by two -hp induction motors. Spindle eed is 3200 rpm. *Write*: Stone chinery Co. Inc., Manlius, N. Y. *one*: Manlius 62-2411

ansfer Machine

The 45-station machine does 249 illing, boring, reaming and tap- ng operations on 52 transmis- n cases in an hour.

Many electrical components aid erations. One automatically obes each hole before it is oped.

Every moving component of the ansfer machine is automatically bricated. The ways are made of rdened - and - ground laminated ol steel. *Write*: Buhr Machine ol Co., Ann Arbor, Mich. *Phone*: rmandy 2-5646

huttle Conveyor

The Delpark-Jamesway conveyor erates on a single level. It runs a trough or trench.

A shuttle drive bar rests on the ttom at either side or in the nter. Hinged to it are blades hich open to the width of the trough as the drive bar starts its forward movement. Blades move the material to the maximum forward stroke of the drive bar. As movement is reversed, blades fold back against the drive bar and by-pass the material advanced by the blade in back.

Trough and blade widths range from 6 to 30 in. The stroke can be adjusted to advance rapidly and return slowly, or to advance slowly and return rapidly. *Write*: Dept. J-297, Industrial Filtration Co., Lebanon, Ind. *Phone*: 1877

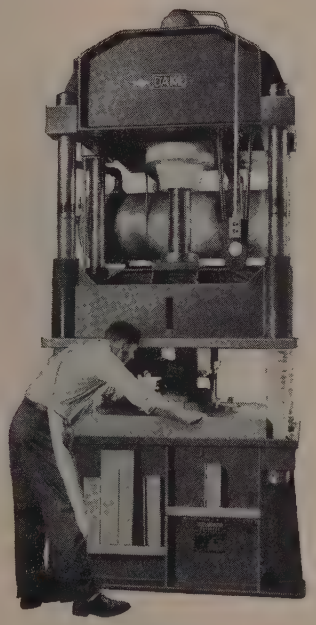
Core Coating

A nondrip, carbon-free refractory foundry core coating called Red-Skin is recommended for steel, gray iron and the nonferrous metals.

The coating works deeply into cores, preventing metal penetration.

A uniform surface coating prevents burn-in and sand sintering. Maximum fill is obtained on porous core areas.

The coating is easy to mix, does



"Now we can handle more and bigger jobs"

The experience of Michigan Machine and Tool Co. duplicates that of many other custom die shops who have installed a Dake Die Try-Out Press

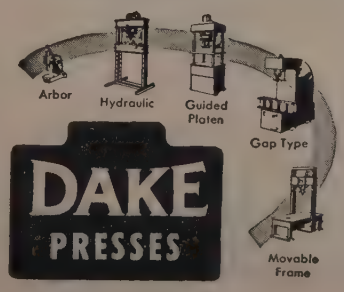
Michigan Machine & Tool Co. of Grand Rapids earned an enviable reputation as diemakers for a number of important manufacturers, but they were limited to building smaller size dies for lack of try-out facilities.

"We found it quite impractical," they said, "to interrupt a customer's production while we tried out a die on his press."

Since installing a Dake Die Try-Out Press, Michigan Machine & Tool Co. is being commissioned to make more dies, and bigger dies . . . bringing a substantial increase in business and correspondingly in profits.

Information on Dake Die Try-Out Presses is contained in Bulletin No. 330 . . . send for a free copy today.

DAKE CORPORATION, 640 Seventh St., Grand Haven, Mich.



Send for Big New Catalog

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640 Seventh St., Grand Haven, Mich.
Please send me a copy of Dake Bulletin 330
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Company_____
Address_____
City_____ Zone____ State_____

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WYCKOFF STEEL PRODUCTS—Carbon and Alloy Steels • Turned and Polished Shafting
Turned and Ground Shafting • Wide Flats up to 12"x2", All types of furnace treated Steels

NEW PRODUCTS and equipment

not streak, teardrop, run down build up in fillets. *Write*: Freder B. Stevens Inc., 1800 18th St., D troit 16, Mich. *Phone*: Tashm 5-0725

Air Filtration

A new process, Ultrafiltratio offers supercleaning of atmosphe ic air with industrial air filtrati equipment.

The process uses conventional i dustrial collectors of the tubul cloth type. Filter bags are charg with a filter aid that precoats t filtering surfaces and provides highly efficient matrix upon whi the fine particles of atmospher dust and tarry matter are collecte One application of filter aid las from two to three years.

In one operating installation wi a design volume of 720,000 cfm city air, the process reduces t dust content from 5.21 to 0.04 n per 1000 cu ft. Collection ef ciency is 99.23 per cent. *Writ* Wheelabrator Corp., 1157 S. Byrk St., Mishawaka, Ind. *Phone*: Blac burn 5-2141

Degasser

This mobile degasser for found use will accommodate up to N 400, type-A or No. 3600, type crucibles.

Degassing by the unit results cleaner castings, eliminates t need for gas or chemical flushin improves the physical characteri

lumet Division, Calumet and Hecla, Inc., Calumet, Michigan

"Cities Service Heat Prover Played A Major Role In Our Expansion Program"

ners and refiners of copper, the Calumet, Michigan Divi- n of Calumet and Hecla, Inc., relies on two power plants operate its many mines, reclamation plants, mills, manu- turing facilities and mine rehabilitation projects.

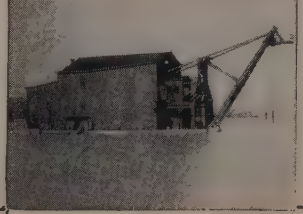
The two plants, located at Lake Linden and Hubbell, re recently brought up to date. The Lake Linden plant w has modern steam generating equipment fired with pul- ized coal. The Ahmeek plant was equipped with new coal tributors for its underfeed stokers and new plastic mono- ic furnace settings.

This modernization program, along with a planned pre- tive maintenance program which is now being put into ct, is expected to raise the KW capacity of these plants m 20 megawatts to 30 within the next few months.

The Cities Service Heat Prover has played a major role this improvement program. It is used extensively to ex- ine combustion conditions in the furnaces, check station truments, and guard against air infiltration through boiler settings and duct work, thus enabling plant personnel to operate the equipment constantly at design efficiencies or better.

Says Power Superintendent, Robert Hein: "The portable Cities Service Heat Prover has proved invaluable in our operation. We are now using 150,000 tons of coal per year and operating at boiler efficiencies around 86%. By giving us a quick, accurate check on our firing conditions, the Heat Prover has been directly responsible for much of this record."

The Heat Prover is supplied and maintained free by Cities Service. For further information write Cities Service Oil Co., Sixty Wall Tower, New York 5, N. Y.



Calumet Reclamation Operation reclaims stamp sands processed years ago and dumped into lake. Further processing will extract copper. For power, dredge relies on the Calumet Division's Lake Linden Power Plant.

Taking Readings With Heat Prover has helped Calumet Division achieve 86% boiler efficiency. Will aid further in raising KW capacity from 20 to 30 megawatts. The unique instrument enables maximum heat benefits from coal.

CITIES SERVICE

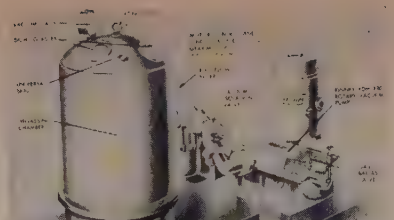
QUALITY PETROLEUM PRODUCTS

NEW PRODUCTS and equipment

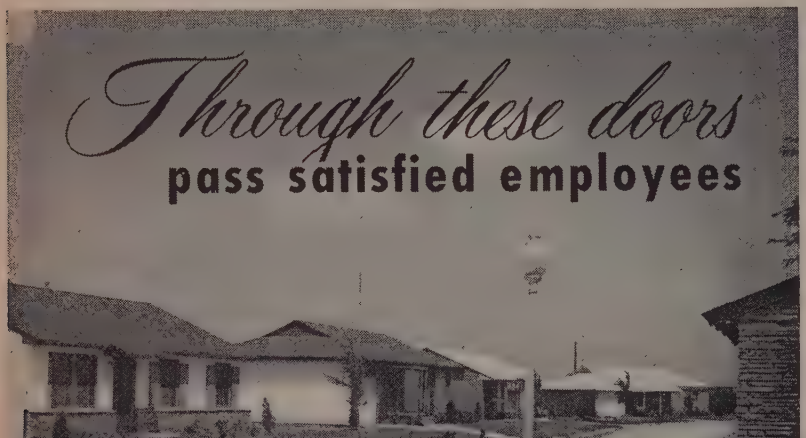
tics of the metal, allows use of lower grade secondary metals and makes impregnation unnecessary.

The unit, mounted on wheels, is 6 ft square and 5 ft high. It has a mechanical vacuum pump and gear motor, a filter and a degassing chamber. Three sight ports 4 in. in diameter permit observation of the melt.

The complete degassing cycle usually takes from 5 to 15 minutes.



Write: Kinney Mfg. Division, New York Air Brake Co., 3640 Washington St., Boston, Mass. *Phone*: Jamaica 4-3220



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First-in, first-out live storage provided for boxed or palleti loads, tote pans and similar c tainers.

The strong, wide-based desi of the live rails makes them id for racks. Racks take about h the number of rails genera used because the live rails ha two rows of wheels, and each r serves two lanes.

Guards are built integrally w the rails. Assembly is simple, a the width of lanes can be chan quickly on the job. Length, wi and height are adjustable. *Wri* Alvey-Ferguson Co., Cincinnati O. *Phone*: Redwood 1-7000

Hydrogen Determinatio

This ignition train reduces ti for hydrogen determination to minutes.

It determines concentrations low as 0.003 per cent and as h as those in metal hydrides.

A large sample, up to 10 gra can be used. A carbon determi tion can be made at the same ti *Write*: Ledoux & Co., 359 Alf Ave., Teaneck, N. J. *Phone*: T neck 7-7160

New Literature

rite directly to the company for a copy

uctile Iron

Typical applications and informa-n on ductile iron are presented—eader Service Section, Internation- Nickel Co. Inc., New York 5, N. Y.

ubmerged Combustion

The use of high velocity burners r heating liquids is described—bul-in 110, 2 pages. Thermal Research Engineering Corp., Conshohocken, .

itrogen Generators

A detailed flow diagram explains e operation of nitrogen generators bulletin 1-100, 6 pages. C. M. emp Mfg. Co., 405 E. Oliver St., ltimore 2, Md.

ardness and Strength

This chart shows the approximate lationship between the tensile rength and hardness of carbon and oy steels—as measured by Brinell, onotron, Vickers and the B, C and Rockwell scales. Tubular Prod-ts Division, Babcock & Wilcox Co., aver Falls, Pa.

ubricants

The advantages of molybdenum di-lphide lubricants where bearing essure is extreme and at all tem-ratures are described — bulletin 3A, 4 pages. Alpha Molykote rp., 65 Harvard Ave., Stamford, nn.

ickel Silver

This catalog gives complete in-rmation on nickel silver, phosphor onze and special alloys in strip, eet and coils—60 pages. Water-ry Rolling Mills Inc., Waterbury, nn.

ire Construction

Thirty-six illustrated case his-ries show how you can reduce sts by including wire in product sign—12 pages. E. H. Titchener Co., 67 Clinton St., Binghamton, Y.

essure Measurement

A new linear, force-balance in-rument pneumatically transmits e measurement of pressure differ-ces up to 300 psi—bulletin MSP-0, 4 pages. Hagan Corp., 323 urth Ave., Pittsburgh 30, Pa.

Drilling

Finish machining of deep holes in solid metal or cored holes in castings is illustrated—bulletin 31154, 8 pages. Ex-Cell-O Corp., Detroit 32, Mich.

High Speed Steel

A data sheet gives information on a free machining molybdenum-tungsten steel. Sales Dept., Allegheny Ludlum Steel Corp., 2020 Oliver Bldg., Pittsburgh 22, Pa.

Switchboards

The building block concept, as applied to switchboards with basic circuits, and basic circuit specifications in duplex switchboards are discussed —bulletin GEA-4127B. General Electric Co., Schenectady 5, N. Y.

Turbodiesel

Turbocharging and its advantages when applied to diesels are presented —16 pages. Cummins Engine Co. Inc., Columbus, Ind.

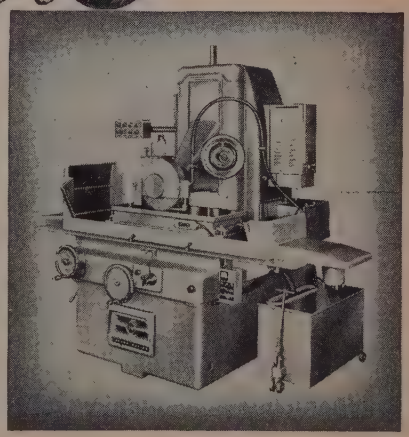
Forgings

"What Is a Forging?" tells how forgings are made and their uses—8 pages. "Management Guide to the Use of Forgings" states the advan-

FOUND WHERE WORLD FAMOUS TRACTORS ARE "BORN"

GRAND RAPIDS GRINDERS

The makers of these famous tractors and allied heavy-duty equipment use Grand Rapids Grinders in their toolrooms. In fact, you'll find Grand Rapids Grinders wherever manufacturers place a premium on precision . . . because they're designed and built for lifetime precision grinding. Take our Model 560, shown at right. Its column and base are a massive, one-piece casting for permanent, rigid alignment. Wheel head has powered rapid vertical travel; cross feed and longitudinal travel table are hydraulically actuated. Table speed is variable up to 140 fpm, making this the *fastest* grinder of its type and size!
If you're not already enjoying these standout features in your toolroom, a note on your letterhead will bring full details.



Grand Rapids No. 560 Hydraulic Feed Surface Grinder. Table speed up to 140 fpm. Working surface of table is 14" x 36". Vertical movement of wheel head is 18". Preloaded ball bearing spindle greased for life. Spindle speeds 1800 and 2140 rpm.

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GALLMEYER & LIVINGSTON CO. 407 STRAIGHT AVE., S.W. GRAND RAPIDS, MICHIGAN

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Let's be honest! Any one of several kinds of gages can be applied to a dimensional control problem. But only *one* can be economically justified. For example, an air gage is all too frequently purchased for jobs where a dial indicating gage is sufficiently accurate and fast and will serve at half the price. When are extreme speed and accuracy worth the extra cost? Your profits depend on the answer.

Federal can afford to give you an honest answer. We know the economics of all kinds of gages because we make such a wide variety, as you can see in the column at the right. Whatever we recommend, we have a chance for a sale. So, why play favorites? Using this unbiased approach, our engineers make unhedged recommendations of the best gage for any job.

It pays to compare recommendations. Why not adopt this buying policy? Ask Federal first for unbiased recommendations from the most complete gage line. Then, compare our choices with any others. We're willing to rest our case on your good judgment. Write or call us today.

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NEW LITERATURE

tages forgings give the designer, m allurgist, purchasing agent and m agement—6 pages. Drop Forging sociation, 419 S. Walnut St., I sing 33, Mich.

Pump Seals

One-piece pump seals for use rotary shafts of boiler feed pu and process pumps are describe bulletin AD-151, 12 pages. Garl Packing Co., Palmyra, N. Y.

Hose Couplings

Described are a quick-connect coupling with swiveling to prev hose twisting and a sealing ac that makes the coupling tighter internal pressure rises—20 pages. dustrial Sales, Titeflex Inc., 10 H dee St., Springfield 4, Mass.

Grease and Oils

A chart shows the life of a gre that can be used at 250° F—bull 40. How to use an antirust coa oil to protect sheet and strip s and ferrous castings is told in bu tin 42, 2 pages. A nonemulsify transparent cutting oil for steel described—bulletin 39, 1 page. Oil Co., 1608 Walnut St., Phila phia 3, Pa.

NEW BOOKS

Engineering Standards Multiple Belt Drives, Multiple V-Belt D & Mechanical Power Transmis Association and the Rubber M ufacturers Association, Mult V-Belt Drive & Mechanical Po Transmission Association, 27 Monroe St., Chicago 3, Ill. pages, $1.
Revised manual indicates the pr sheaves and belts to be used for timum efficiency and economy.

Power Sawing Hand Book, DoAll 254 N. Laurel, Des Plaines, Ill. pages, $1.
Topics covered range from the or of the saw to cutoff methods, to s ing recommendations and the cha teristics of steel.

Steel Designers' Manual, Charle Gray, Lewis E. Kent, W. A. Mi ell and G. Bernard Godfrey, E erick Ungar Publishing Co., E. 24th St., New York 10, N 909 pages, $12.50.
This manual, prepared for Br steelmakers, gives all the infor tion needed for the design of framed buildings.

Market Outlook

USINESS can't help but be good in 1956. Con-truction activity and steel demand give that ssurance. When they're good, almost every-ning else is, too.

Construction, the government says, will set record—$44 billion—in 1956, a 5 per cent rise ver the expected $42-billion peak for 1955. ubstantial gains in 1956 are anticipated in rivate nonresidential and public construction—egments that require a considerable amount of teel, particularly structurals.

HOKE POINT— Deliveries of fabricated tructural steel already are extended to the oint where they are restricting new orders. ome fabricators are booked ahead eight and ine months, and others almost as far—too far or builders to want to commit themselves on ome projects. Result: Some jobs are being ropped quietly before they reach the formal idding stage.

Lack of structurals is holding some fabri-ators to a four-day workweek.

RECAUTIONARY— In estimating an increased olume for second and third-quarter delivery, tructural fabricators are taking into consider-tion the possible higher price of plain materi-l and a rise in other costs. As a result, fabri-ators' prices for next year are substantially igher than those in the first half of 1955, and scalator terms are more protective.

UILDUP— The upsurge in demand for fabri-ated structural steel boosted backlogs 50 per ent between Jan. 1 and Sept. 30. Big chunks re being added to the backlog. In the last week, x awards of orders for fabricated structurals for Connecticut turnpike and highway use totaled 16,430 tons.

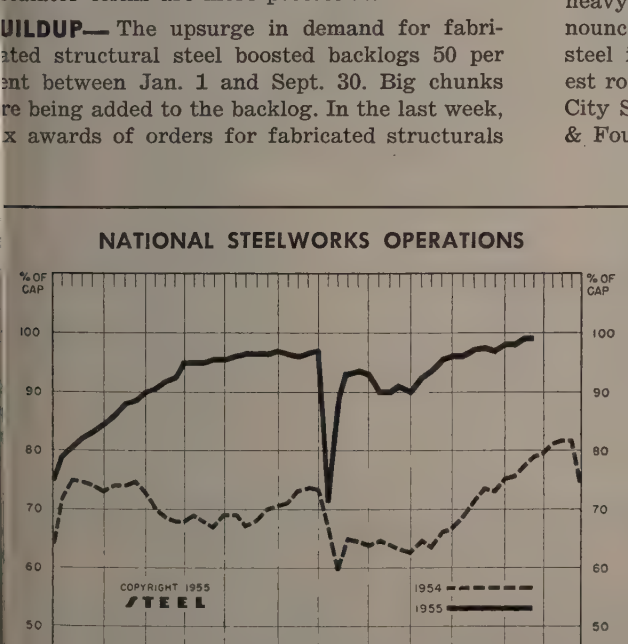
Because a big demand for steel is shaping up for 1956, some producers of sheets are seeking a guide for their second-quarter scheduling: They are encouraging customers to send in inquiries on bare needs for that period. Sheet mills are being offered far more tonnage than they can handle, and they must allot their outturn.

MORE BUSINESS— Railroads — latecomer in the steel marketplace—are adding to the overall demand for steel. They've recently been ordering freight cars by the trainload. They'll need rails, too. Getting on the books for the latter is the Louisville & Nashville Railroad. It ordered 35,000 tons of 132-lb rail.

TOP SPEED— The undiminished call for steel held production of steel for ingots and castings in the week ended Nov. 20 at 99 per cent of capacity for the second consecutive week. That's equivalent to 2.4 million net tons. This continues the recordbreaking pace of October. In that month, more steel—10,502,000 net tons—was made for ingots and castings than in any previous month. This boosted production for the first ten months to a new record—96,286,118 tons.

MORE EXPANSION— Prospects for continued heavy demands for steel are prompting announcements of additional expansions in the steel industry. First blast furnaces in the latest round of expansions will be built by Granite City Steel Co., Granite City, Ill., and U. S. Pipe & Foundry Co., North Birmingham, Ala.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

	Week Ended Nov. 20	Change	Same Week 1954	Same Week 1953
Pittsburgh	102.5	+ 0.5*	76	81
Chicago	97.5	— 1.5*	85.5	98
Mid-Atlantic	98	+ 0.5	71	90
Youngstown	100	0	82	96
Wheeling	100	+ 1	92	98
Cleveland	99	— 1.5*	88	99
Buffalo	105	0	97.5	100
B'rmingham	94.5	+ 0.5	64	96.5
New England	90	— 1	58	85
Cincinnati	92.5	0	76	59.5
St. Louis	90.5	— 6*	83.5	90
Detroit	98	— 1	80	97.5
Western	99	— 1	86	94
National Rate	99	0	79	90.5

INGOT PRODUCTION‡

	Week Ended Nov. 20	Week Ago	Month Ago	Year Ago
INDEX (1947-1949=100)	148.4†	149.7	148.5	117.8
NET TONS (In thousands)	2,384†	2,404	2,386	1,892

*Change from preceding week's revised rate. †Estimated. ‡Amer. Iron & Steel Institute. Weekly capacity (net tons): 2,413,278 in 1955; 2,384,549 in 1954; 2,254,459 in 1953.

Working Outlook—p. 41 Technical Outlook—p. 91

Price Indexes and Composites

FINISHED STEEL PRICE INDEX (Bureau of Labor Statistics)

	Nov. 15 1955	Nov. 8 1955	Month Ago	Oct. Average
(1947-1949=100)	154.5	154.5	154.5	154.5

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Nov. 15

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parenthesis. For complete description of the following products and extras and deductions applicable to them write to STEEL.

Rails, Standard, No. 1	$4.800	Sheets, Electrical	$10.200
Rails, Light, 40 lb	6.217	Strip, C.R., Carbon	7.993
Tie Plates	5.625	Strip, C.R., Stainless, 430 (lb)	0.444
Axles, Railway	8.000	Strip, H.R., Carbon	5.350
Wheels, Freight Car, 33 in. (per wheel)	52.50	Pipe, Black, Buttweld (100 ft)	16.366
Plates, Carbon	4.950	Pipe, Galv., Buttweld (100 ft)	19.971
Structural Shapes	4.867	Pipe, Line (100 ft)	158.925
Bars, Tool Steel, Carbon (lb)	0.460	Casing, Oil Well, Carbon (100 ft)	165.120
Bars, Tool Steel Alloy, Oil Hardening Die (lb)	0.560	Casing, Oil Well, Alloy (100 ft)	244.670
Bars, Tool Steel, H.R., Alloy, High Speed W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.185	Tubes, Boiler (100 ft)	39.470
Bars, Tool Steel, H.R. Alloy, High Speed W-18, Cr 4, V 1 (lb)	1.680	Tubing, Mechanical, Carbon	20.980
Bars, H.R., Alloy	9.375	Tubing, Mechanical, Stainless, 304 (100 ft)	178.897
Bars, H.R., Stainless, 303 (lb)	0.450	Tin Plate, Hot-dipped, 1.25 lb	8.933
Bars, H.R., Carbon	5.350	Tin Plate, Electrolytic, 0.25 lb	7.633
Bars, Reinforcing	5.313	Black Plate, Canmaking Quality	6.733
Bars, C.F., Carbon	8.660	Wire, Drawn, Carbon	8.575
Bars, C.F., Alloy	12.175	Wire, Drawn, Stainless 430 (lb)	0.578
Bars, C.F., Stainless, 302 (lb)	0.468	Bale ties (bundle)	6.473
Sheets, H.R. Carbon	5.145	Nails, Wire, 8d Common	8.618
Sheets, C.R., Carbon	6.239	Wire, Barbed (80-rod spool)	7.847
Sheets, Galvanized	7.690	Woven Wire Fence (20-rod roll)	18.635
Sheets, C.R., Stainless, 302 (lb)	0.588		

STEEL's FINISHED STEEL PRICE INDEX*

	Nov. 16 1955	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Index (1935-39 av.=100)	208.90	208.90	208.90	194.53	157.76
Index in cents per lb	5.659	5.659	5.659	5.270	4.274

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT*	$128.14	$128.14	$128.14	$117.95	$95.09
No. 2 Fdry, Pig Iron, GT	58.99	58.99	58.99	56.54	49.54
Basic Pig Iron, GT	58.49	58.49	58.49	56.04	49.04
Malleable Pig Iron, GT	59.77	59.77	59.77	57.27	50.27
Steelmaking Scrap, GT	45.67	45.33	45.00	33.67	41.67

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point

FINISHED STEEL	Nov. 16 1955	Week Ago	Month Ago	Year Ago
Bars, H.R., Pittsburgh	4.65	4.65	4.65	4.30
Bars, H.R., Chicago	4.65	4.65	4.65	4.30
Bars, H.R., deld. Philadelphia	4.90	4.90	4.90	4.55
Bars, C.F., Pittsburgh	5.90	5.90	5.90	5.40
Shapes Std., Pittsburgh	4.60	4.60	4.60	4.25
Shapes, Std., Chicago	4.60	4.60	4.60	4.25
Shapes, deld., Philadelphia	4.88	4.88	4.88	4.53
Plates, Pittsburgh	4.50	4.50	4.50	4.225
Plates, Chicago	4.50	4.50	4.50	4.225
Plates, Coatesville, Pa.	4.80	4.80	4.80	4.225
Plates, Sparrows Point, Md.	4.50	4.50	4.50	4.225
Plates, Claymont, Del.	4.80	4.80	4.50	4.225
Sheets, H.R., Pittsburgh	4.325	4.325	4.325	4.05
Sheets, H.R., Chicago	4.325	4.325	4.325	4.05
Sheets, C.R., Pittsburgh	5.325	5.325	5.325	4.95
Sheets, C.R., Chicago	5.325	5.325	5.325	4.95
Sheets, C.R., Detriot	5.325-5.425	5.325-5.425	5.325-5.425	5.10
Sheets, Galv., Pittsburgh	5.85	5.85	5.85	5.45
Strip, H.R., Pittsburgh	4.325	4.325	4.325	4.05
Strip, H.R., Chicago	4.325	4.325	4.325	4.05
Strip, C.R., Pittsburgh	6.25	6.25	6.25	5.75
Strip, C.R., Chicago	6.35	6.35	6.35	5.85
Strip, C.R., Detroit	6.35	6.35	6.35	5.60-5.90
Wire, Basic, Pittsburgh	6.25	6.25	6.25	5.75
Nails, Wire, Pittsburgh	7.60	7.60	7.60	6.85
Tin plate (1.50 lb), box, Pitts.	$9.45	$9.45	$9.45	$9.05
SEMIFINISHED STEEL				
Billets, Forging, Pitts. (NT)	$84.50	$84.50	$84.50	$78.00
Wire rods, ⅜-⅝" Pitts.	5.025	5.025	5.025	4.675
PIG IRON, Gross Ton				
Bessemer, Pitts.	$59.50	$59.50	$59.50	$57.00
Basic, Valley	58.50	58.50	58.50	56.00
Basic, deld. Phila.	62.16	62.16	62.16	59.66
No. 2 Fdry, Pitts.	59.00	59.00	59.00	56.50
No. 2 Fdry, Chicago	59.00	59.00	59.00	56.50
No. 2 Fdry, Valley	59.00	59.00	59.00	56.50
No. 2 Fdry, deld. Phila.	62.66	62.66	62.66	50.16
No. 2 Fdry, Birm.	55.00	55.00	55.00	52.88
No. 2 Fdry (Birm.) deld. Cin.	62.70	62.70	62.70	60.58
Malleable, Valley	59.00	59.00	59.00	56.50
Malleable, Chicago	59.00	59.00	59.00	56.50
Ferromanganese, Duquesne.	190.00†	190.00†	190.00†	190.00†

†74-76% Mn, net ton. *75-82% Mn, gross ton, Etna, Pa.

SCRAP, Gross Ton (Including broker's commission)

No. 1 Heavy Melt, Pitts.	$45.50	$44.50	$44.50	$34.50
No. 1 Heavy Melt, E. Pa.	47.00	47.00	46.50	33.50
No. 1 Heavy Melt, Chicago	44.50	44.50	44.00	33.50
No. 1 Heavy Melt, Valley	48.00	48.00	48.00	34.50
No. 1 Heavy Melt, Cleve.	45.50	45.50	45.50	32.50
No. 1 Heavy Melt, Buffalo	43.50	43.50	38.50	32.50
Rails, Rerolling, Chicago	66.50	65.50	65.50	54.50
No. 1 Cast, Chicago	47.50	47.50	48.50	39.50

COKE, Net Ton

Beehive, Furn, Connlsvl.	$13.625	$13.625	$13.625	$13.75
Beehive, Fdry, Connlsvl.	16.50	16.50	16.50	16.75
Oven, Fdry, Chicago	25.75	25.75	25.75	24.50

Daily Nonferrous Price Record

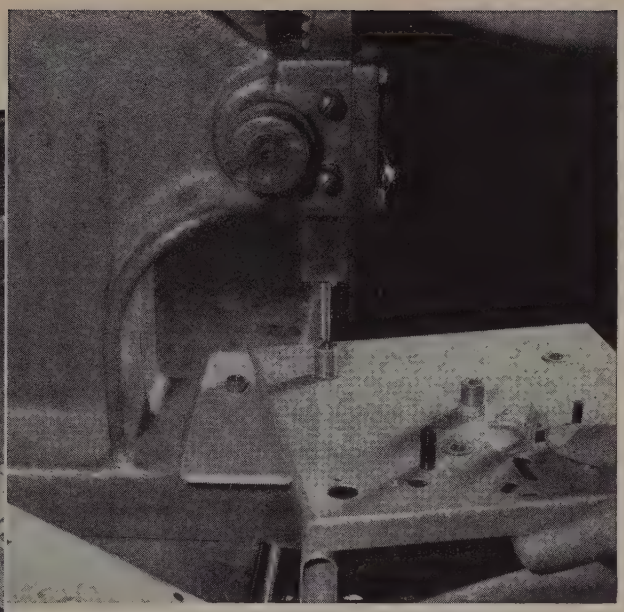
	Price Nov. 16	Last Change	Previous Price	Oct. Avg.	Sept. Avg.	Nov. 1954 Avg.
Copper	43.00–45.00	Oct. 7, 1955	43.00–50.00	44.594	45.380	30.000
Lead	15.30	Sept. 26, 1955	14.80	15.300	14.920	14.800
Zinc	13.00	Oct. 21, 1955	13.00–13.50	13.020	12.940	11.500
Tin	98.50	Nov. 16, 1955	97.50	96.230	96.565	91.196
Nickel	64.50	Nov. 24, 1954	60.00	64.500	64.500	60.000
Aluminum	24.40	Aug. 8, 1955	23.20–24.40	24.400	24.400	22.200
Magnesium	32.50	Aug. 16, 1955	28.50	32.500	32.500	27.000

Quotations in cents per pound b
COPPER, deld. Conn. Valley; LE
mon grade, deld. St. Louis
prime western, E. St. Lou
Straits, deld, New York; NICK
trolytic cathodes, 99.9%, base
refinery, unpacked; ALUMINUM,
ingots, 99 + %, deld.; MA
99.8%, Freeport, Tex.

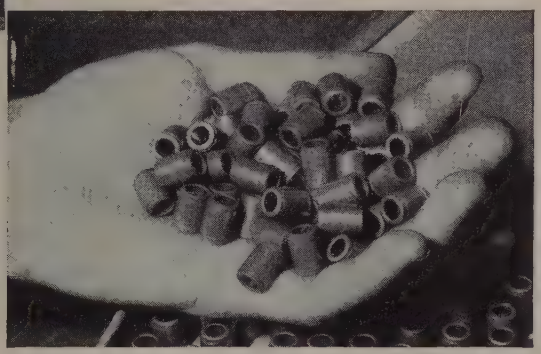
What You Can Use the Markets Section for:

- **A source of price information.**
  Current prices are reported each week. Price changes are shown in italics. Price trends are shown in tables of indexes and comparisons.
- **A directory of producing points.**
  Want to know who makes something, or where it is made? The steel price tables alphabetically list the cities of production and indicate the producing company. If you are a buyer, you may want to make a map showing comparative distances of sources of supply and to help you compute freight costs. If you are a seller of supplies you can make a map to spot your sales possibilities.
- **A source of price data for making your own comparisons.**
  Maybe you want to keep a continuous record of spread between various forms of steel. You can get base price information from STEEL's price tables.
- **A source of information on market trends.**
  Newsy items tell you about the supply-demand situ of materials, including iron and steel, nonferrous m and scrap. Other articles analyze special situations o terest and importance to you.
- **Reports on iron and steel production, and materials and uct shipments.**

Johnson Ledaloyl self-lubricating bearings hold oil like a sponge—will never need oiling for the life of Telectro tape recorders. Here one is being slipped on to the shaft of component.



Accuracy of Ledaloyl bearings makes for snug press-fit in the base plate of Telectro recorder.



A handful of trouble-free service for Telectro—Johnson Ledaloyl bearings assure durability of recorder, yet are economical and easy to install.

r Accuracy, Durability And onomy, Telectro Industries ses Johnson Ledaloyl lf-Lubricating Bearings

Telectro Industries Corporation of Long Island City, New York, insists that every component of their wire and tape recorders must have the quality and stamina to give trouble-free service for the life of the machine.

That is why they chose Johnson Ledaloyl bearings according to Mr. Roy Yasen, Purchasing Agent, who says: "Everything considered—accuracy, price and delivery—we find these self-lubricating bearings to be the most durable in this price range." "People who buy these recorders won't be bothered with taking them apart to oil bearings," continues Mr. Yasen, "that's why we use Johnson Ledaloyl bearings, that have the oil right in them. They last as long as the machines, without lubrication."

A Johnson distributor services Telectro, gives them immediate delivery on stock sizes, calls in a Johnson field engineer to help work out any special items.

Your local Johnson distributor has available more than 400 stock sizes in three basic types—he will be glad to work with you in developing new economy and performance in the items you manufacture. Johnson Bronze Company, 550 South Mill Street, New Castle, Pennsylvania.

Johnson Bearings

GRAPHITED
over 175 sizes

GENERAL PURPOSE
over 900 sizes

UNIVERSAL BRONZE BARS
over 400 sizes

LEDALOYL
over 400 sizes

ELECTRIC MOTOR
over 350 sizes

Nonferrous Metals

With the U. S. getting out of the aluminum stockpiling business temporarily, primary producers can get a better view of how much expansion is needed

Nonferrous Metal Prices, Pages 130 & 131

THE GOVERNMENT will not buy any aluminum for stockpile during the first half of 1956. In addition, it is delaying until Apr. 30, 1956, a delivery of 25,000 tons of aluminum due this quarter.

What It Means—"Now," says one industry spokesman, "we can sit down and make some intelligent decisions pertaining to expansion."

For several years government buying for stockpile was the needed stimulus for aluminum expansion, but during 1955, it became a major obstacle. Producers did not know from month to month how much aluminum would be taken for stockpile. Bankers, wanting to know where aluminum production is going, have been somewhat reluctant to talk about lending more money for expansion when the government's policy was vacillating. Armed with this new decision, the aluminum industry can show the "banker" how all its production (and more) can be used—without stockpile help.

Statistics—It takes some serious thought before embarking on an aluminum expansion program. While it takes about $300 a ton for new steelmaking facilities, a ton of aluminum requires an outlay of $1000 or more (new facilities, not expansion of current plants).

Case Study—Aluminium Ltd. estimates that it is spending some $2 million a week on expansion. Last year this Canadian aluminum ingot producer had sales which were about equal to Reynolds Metals Co.'s. Shipping 40 per cent of its metal to the U. S., it expects to increase its shipments to 241,500 tons of ingots (see table) in 1955. This compares with 204,725 tons in 1954 and a scheduled minimum of 290,000 tons next year.

Emphasis is being placed on its Kitimat, B. C., facilities. The installed capacity of 91,500 tons was put into operation in August, 1954. Construction under way will bring in an additional 240,000 tons. By the end of 1956, some 90,000 tons of this will be in operation. The balance will come into operation at various stages, but will be completed in 1959.

In the U. S., the bullish feeling toward aluminum continues. Olin-Mathieson Chemical Corp. is ready to spend an initial $85 million to enter the field. St. Joseph Lead Co. will come in sooner or later. Anaconda Co. is working on its 60,000-ton facilities and should have them operating at full tilt by the first of the year. Harvey Aluminum Co. is bringing in some 54,000 tons of new capacity. And Alcoa, Reynolds and Kaiser will not be caught napping when it comes to spen money for expansion.

Shipments by Aluminium Sales Ltd. to the U.S.

(aluminum, in short tons)

	To Producers	To Independents	Total
1955*	130,000	111,500	241,500
1954	87,900	116,825	204,725
1953	105,300	124,500	229,800
1950	127,356	32,300	159,656
1946	28,059	1,390	29,449

*Aluminium Ltd. estimate
(Totals include aluminum from all sources but exclude shipments to U. S. government)

Copper Outlook

Barring political uprisings, a f up in labor or an overnight inc in demand, the copper shortage be coming to an end.

While copper is being purch somewhat on a basis of coppe day to melt tomorrow, de through the rest of this year remain high as companies scra to build LIFO inventories.

There will be no price redu during November and Decer Steady demand will see large ducers continue to quote 43 a pound, while custom smelters continue to receive 45 cents a p through December. After that: for prices to take a nose dive. son: Copper is priced too high mand should slacken and many i tries (and the government) are ducting thorough research prog to find substitute materials.

Herbert Barchoff, president, per & Brass Warehouse Associa reports: "The copper industry start re-educating manufacture the advantages of copper or s a continual decline in sales profits." Mr. Barchoff explains if military requirements should in the future, private industry n not be interested in filling the v um. Another factor: "Many industries working on defense tracts are setting up specifica which eliminate copper compl from items which have furnished bulk of our business. This has particularly true in the electrical electronics field," says Mr. Barc

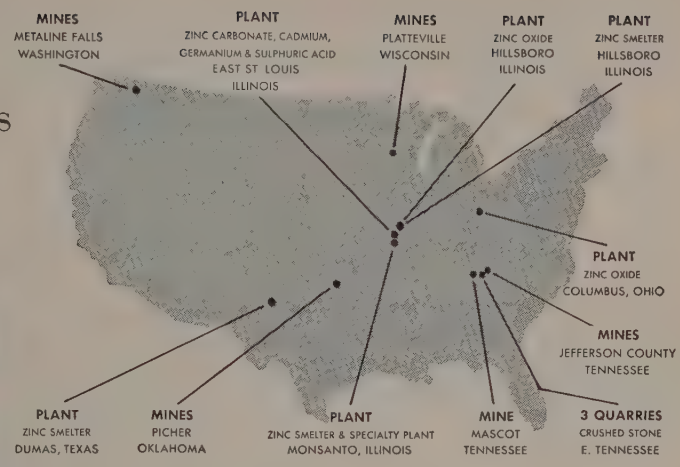
Nickel: Problems Multiply

The growing shortage of nick bringing increased pressure for kind of a solution. While most ernment officials admit that con could be restored, no one feels their return will solve the situa

Opinions are circulating in W ington: One group feels that government should divert all n to the civilian market. This is b on thinking that there would be trouble if the U. S. were out of market.

Still others are promoting the that if war comes it will be of blitz type—over in six weeks. St piled materials will be of little v

American Zinc and its products *from* A *to* Z



FAIRMONT CITY, ILLINOIS
(East St. Louis)

Operations include: roasting and sintering of zinc concentrates; cadmium plant producing commercial balls, sticks and plates; zinc carbonate plant; germanium plant producing germanium dioxide for the electronics industry. Sulphuric acid is produced by both the Chamber and Contact methods. For complete picture of American Zinc operations, see map above.

PRODUCERS OF

ALL GRADES OF SLAB ZINC
ZINC ANODES (Plating & Galvanic)
METALLIC CADMIUM
SULPHURIC ACID
LEAD-FREE and LEADED ZINC OXIDES
ZINC CARBONATE
GERMANIUM DIOXIDE
AGRICULTURAL LIMESTONE
CRUSHED STONE

Distributors for

American Zinc sales Company

AMERICAN ZINC, LEAD & SMELTING COMPANY

Columbus, Ohio • Chicago • St. Louis • New York • Detroit • Pittsburgh

Nonferrous Metals

Cents per pound, carlots, except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99 + %, ingots 24.40, pigs 22.50. 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 12% Si, 26.20; No. 43, 5% Si, 26.00; 142, 4% Cu, 1.5% Mg, 2% Ni, 28.20; No. 195, 4.5% Cu, 0.8% Si, 27.60; No. 214, 3.8% Mg, 27.80; No. 356, 7% Si, 0.3% Mg, 26.20.

Antimony: R.M.M. brand, 99.5%, 33.00, Lone Star brand, 33.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.50-28.50, New York, duty paid, 10,000 lb or more.

Beryllium: 97%, lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $72.75 per lb of contained Be, f.o.b. Reading, Pa., Elmore, O.

Beryllium Copper: 3.75-4.25% Be $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. Reading, Pa. or Elmore, O.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.70 per lb, deld.

Cobalt: 97-99%, $2.60 per lb for 550-lb keg; $2.62 per lb for 100-lb case; $2.67 per lb under 100 lb.

Columbium: Powder, $119.20 per lb, nom.

Copper: Electrolytic, 43.00 deld. Conn. Valley; 43.00 deld. Midwest; custom smelters, 45.50 deld.; Lake, 43.00 deld.; Fire refined, 42.75 deld.

Germanium: 99.9%, $295 per lb, nom.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $100-$120 nom, per troy oz.

Lead: Common, 15.30, chemical, 15.40, corroding, 15.40, St. Louis, New York basis, add 0.20.

Lithium: 99%+, cups, or ingot, $11.50; rod, $13.50; shot or wire, $14.50, f.o.b. Minneapolis, 100 lb lots.

Magnesium: 99.8%, self-palletizing pig, 32.50; notched ingot, 33.25, 10,000 lb or more, f.o.b. Freeport, Tex. For Port Newark, N. J., add 1.40 for pig and 1.45 for ingot; for Madison, Ill., add 1.20 for pig and 1.25 for ingot; for Los Angeles, add 2.00 for both pig and ingot. Sticks 1.3 in. diameter, 53.00, 100 to 4999 lb, f.o.b. Madison, Ill.

Magnesium Alloys: AZ91C and alloys C, G, H and R, 36.00; alloy M, 38.00, 10,000 lb or more, f.o.b. Freeport, Tex. For Port Newark, N. J., add 1.40; for Madison, Ill., add 0.50; for Los Angeles, add 2.50.

Mercury: Open market, spot, New York, $280-$285 per 76-lb flask.

Molybdenum: Powder 99% hydrogen reduced, $3-$3.25 per lb; pressed ingot, $4.06 per lb; sintered ingot, $5.53 per lb.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 64.50; 10-lb pigs, unpacked, 67.65; "XX" nickel shot, 69.00; "F" nickel shot or ingots for addition to cast iron, 64.50; prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 0.92.

Osmium: $80-$100, nom., per troy oz.

Palladium: $22-$24 per troy oz.

Platinum: $97-$105 per troy oz from refineries.

Radium: $16-$21.50 per mg radium content, depending on quantity.

Rhodium: $118-$125 per troy oz.

Ruthenium: $45-$55 per troy oz.

Selenium: 99.5%, $9-$10 per lb.

Silver: Open market, 91.625 per troy oz.

Sodium: 16.50, c.l.; 17.00, l.c.l.

Tantalum: Sheet, rod, $68.70 per lb; powder, $56.63 per lb.

Tellurium: $1.75 per lb.

Thallium: $12.50 per lb.

Tin: Straits, N. Y., spot 98.50; prompt, 98.375.

Titanium: Sponge, 99.3+%, grade A-1 ductile (0.3% Fe max), $3.75, grade A-2 (0.5% Fe max), $3.25 per pound.

Tungsten: Powder, 98.8%, carbon, reduced, 1000-lb lots, $4.50 per lb, nom., f.o.b. shipping point; less than 1000 lb add 15.00; 99+% hydrogen reduced, $4.65. Treated ingots, $6.70.

Zinc: Prime Western, 13.00; brass special, 13.25; intermediate, 13.50, East St. Louis, freight allowed over 0.50 per pound. High grade, 14.35; special high grade 14.50-14.75, deld. Diecasting alloy ingot No. 3, 17.50; No. 2, 18.50; No. 5, 18.00, deld.

Zirconium: Ingots, commercial grade, $14.40 per lb; low-hafnium reactor grade, $23.07. Sponge, $10 per lb. Powder electronics grade, $15 per lb; flash grade, $11.50.

(Note: Chromium, manganese and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 31.50-33.50; No. 12 foundry alloy (No. 2 grade) 30.50-30.75; 5% silicon alloy, 0.60 Cu max, 32.00-32.75; 13 alloy, 0.60 Cu max, 32.00-32.75; 195 alloy, 32.00-32.75; 108 alloy, 30.50. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 31.25-32.25; grade 2, 30.25-31.25; grade 3, 29.50-30.50; grade 4, 29.00-30.00.

Brass Ingot: Red brass No. 115, 41.00; tin bronze No. 225, 54.00; No. 245, 47.25; high-leaded tin bronze No. 305, 44.75; No. 1 yellow No. 405, 32.75; manganese bronze No. 421, 36.25.

Magnesium Alloy Ingot: AZ63A, 34.00; AZ91B, 34.00; AZ91C, 34.00; AZ92A, 34.00.

NONFERROUS MILL PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb, f.o.b. Temple, Pa.; nominal 1.9% Be alloy) Strip, $1.84; rod, bar, wire, $1.81.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 100,000-lb lots, 48 35; 30,000-lb lots 48.88; l.c.l., 48.98. Weatherproof, 100,000-lb lots, 46.03; 30,000-lb lots, 46.28; l.c.l, 46.78. Magnetic wire deld., 15,000 lb or more, 55.52; l.c.l., 56.27.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets, full rolls, 140 sq ft or more, $21 per cwt; pipe, full coils, $21 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $14.00-$14.50; sheared mill plate, $11.00; strip, $14.00-$14.50; wire, $10.00-$10.50; forging billets, $8.75; hot-rolled and forged bars, $8.75.

ZINC

(Prices per lb, c.l., f.o.b. mill) Sheets, 23.00; ribbon zinc in coils, 20 50; plates 19.50-22.25.

ZIRCONIUM

Plate, $22; H.R. strip, $19; C.R. strip, $29; forged or H.R. bars, $17; wire, 0.015 in., 1.00c per linear foot.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	102	83	99
Strip, C.R	102	92	125
Plate, H.R.	97	87	95
Rod, Shapes H.R.	87	74	93
Seamless Tubes	122	110	153
Shot, Blocks		71	...

ALUMINUM

Screw Machine Stock: 30,000 lb base.

Diam. (in.) or across flats	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
Drawn				
0.125	67.9	66.4	...	...
0.156-0.172	57.5	55.9	...	...
0.188	57.5	55.9	...	71.7
0.219-0.234	54.5	52.9	...	...
0.250-0.281	54.5	52.9	...	68.4
0.313	54.5	52.9	...	65.2
Cold-finished				
0.375-0.547	53.4	51.4	63.7	61.3
0.563-0.688	53.4	51.4	60.6	57.5
0.750-1.000	52.1	50.1	55.4	54.2
1.063	52.1	50.1	...	52.3
1.125-1.500	50.1	48.2	53.6	52.3
Rolled				
1.563	48.8	46.9	...	...
1.625-2.000	48.2	46.2	...	50.5
2.125-2.500	47.0	45.0	...	...
2.563-3.375	45.6	43.6	...	...

ALUMINUM

Sheets and Circles: 1100 and 3003 mill f (30,000 lb base; freight allowed)

Thickness Range Inches	Flat Sheet	Flat Sheet Circles*	Coiled Sheet	C S C
0.249-0.136	37.5	42.3	...	
0.135-0 096	38.0	43.2	...	
0.095-0.077	38.7	44.2	36.1	
0.076-0.061	39.3	45.1	36.3	
0.060-0.048	39.9	45.6	36.7	
0.047-0.038	40.4	46.5	37.2	
0.037-0.030	40.8	47.0	37.6	
0.029-0.024	41.4	47.5	37.9	
0.023-0.019	42.2	49.0	38.8	
0.018-0.017	43.0	...	39.4	
0.016-0.015	43.9	...	40.2	
0.014	44.9	...	41.2	
0.013-0.012	46.1	...	41.9	
0.011	47.1	...	43.1	
0.010-0.0095	48.4	...	44.3	
0.009-0.0085	49.7	...	45.8	
0.008-0.0075	51.3	...	47.0	
0.007	52.8	...	48.5	
0.006	54.4	...	49.9	

*48 in. max diam. †26 in. max diam.

ALUMINUM

Plates and Circles: Thickness 0.250-3 24-60 in. width or diam. 72-240 in. lengt

Alloy	Plate Base	Circle
1100-F, 3003-F	36.5	40
5050-F	37.6	41
3004-F	38.6	43
5052-F	39.9	45
6061-T6	41.1	46
2024-T4*	43.6	49
7075-T6*	51.4	58

*24-48 in. widths or diam, 72-180 in. le

ALUMINUM

Forging Stock: Round, Class 1, 39.10- in specific lengths 36-144 in., diameters 0 8 in. Rectangles and squares, Class 1, 4 56.20 in random lengths, 0.375-4 in. t widths 0.750-10 in.

Pipe: ASA. Schedule 40, alloy 6063-T6, lengths, plain ends, 90,000-lb base, per 10

Nom. Pipe Size (in.)		Nom. Pipe Size (in.)	
¾	$16.85	2	$
1	26.50	4	1
1¼	35.85	6	2
1½	42.90	8	3

MAGNESIUM

Sheet: AZ31, commercial grade, 0.032 99c; 0.064 in., 78.00c; 0.125 in., 63.50c, 3 lb and over, f.o.b. mill.

Plate: AZ31, 61.00c, 30.000 lb or more, in. and over, widths 24-60 in., lengths 7 in.; tread plate, 64.00c, 30,000 lb or more in. thick, widths 24-60 in., lengths 60-192 tooling plate 66.00c, 30.000 lbs or more, 3.000 in., widths 60-72 in., lengths 72-18

Extrusions: AZ31 commercial grade, re gles, ¼ x 2 in., 64.70c; 1 x 4 in., 69.50c. 1 in., 61.50c; 2 in., 59.00c. Tubing, 1 in x 0.065 in., 82.50c; Angles, 1 x 1 x ¼ 68.40c; 2 x 2 x ¼-in., 62.50c. Channe in., 63.40c. I-beams, 5 in., 62.70c.

NONFERROUS SCRAP

DEALER'S BUYING PRICES

(Cents per pound, New York, in ton lo

Aluminum: 1100 clippings, 19.50; old s 16.50-17.25; borings and turnings, 11.00-1 crankcases, 16.50-17.25. Industrial ca 16.50-17.25.

Copper and Brass: No. 1 heavy copper wire, 36.50-37.50; No. 2 heavy copper wire, 35.00-36.00; light copper, 32.50-3 No. 1 composition red brass, 29.00-29.50 1 composition turnings, 27.00-27.50;

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCE		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tube	Clean Heavy	Rod Ends	C Tur
Copper	62.76-63.13b	60.36c	....	62.82-63.32	39.000	39.000	3
Yellow Brass	52.27	42.41d	52.81	55.18	28.875	28.625	2
Red Brass, 85%	58.09	58.03	58.63	60.90	34.250	34.000	3
Low Brass, 80%	56.55	56.49	57.09	59.36	32.750	32.250	3
Naval Brass	55.63	49.94	62.69	58.79	26.750	26.500	2
Com. Bronze, 90%	60.18	60.12	60.72	62.74	35.750	35.500	3
Nickel Silver, 10%	66.00	68.33g	68.33	....	32.500	32.250	1
Phos. Bronze, A, 5%	80.99	81.49	81.49	82.67	39.250	39.000	3
Silicon Bronze	66.54	65.73	66.58	68.68e	37.625	37.375	3
Manganese Bronze	59.37-59.45	53.38-53.47	63.82	....	27.000	26.750	2
Muntz Metal	53.74	49.55	....	....	27.000	26.750	2

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-d d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20.000 lb, f.o.b. shi point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb. g. Le

turnings, 15.50-16.00; new brass clip-, 24.00-24.50; light brass, 16.00-16.50; y yellow brass, 18.50-19.00; new brass ends, 23.00-23.50; auto radiators, un-ted, 22.00-22.50; cocks and faucets, 23.50-; brass pipe, 24.50-25.00.

: Heavy, 12.00-12.50; battery plates, 6.50-linotype and stereotype, 13.25-14.25; elec-pe, 12.00-12.75; mixed babbitt, 14.50.

nesium: Clippings, 18.50-19.50; clean cast-18.00-19.00; iron castings, not over 10% vable Fe, less full deduction for Fe, 16.00-.

l: Clippings, 54.50-60.00; old sheets, -50.00; turnings, 44.00; rods, 54.50-60.00.

el: Sheets and clips, 90.00-125.00; rolled es, 90.00-125.00; turnings, 75.00-100.00; nds, 90.00-125.00.

Old zinc, 5.00-6.00; new die-cast scrap, 5.75; old die-cast scrap, 3.25-3.50.

REFINER'S BUYING PRICES
ts per pound, carlots, delivered refinery)

inum: 1100 clippings, 22.50-23.00; 3003 ings, 22.50-22.75; 6151 clippings, 22.50; clippings, 22.50; 2014 clippings, 21.50-; 2017 clippings, 21.50-22.00; 2024 clip-, 21.50-22.00; mixed clippings, 21.50-; old sheet, 19.00-19.50; old cast, 19.50-; clean old cable (free of steel), 22.50; gs and turnings. 19.50-20.50.

lium Copper: Heavy scrap, 0.020-in. and ier, not less than 1.5% Be, 65.00; light , 60.00; turnings and borings, 43.00-55.00.

er and Brass: No. 1 heavy copper and 39.00-40.00; No. 2 heavy copper and 37.50-38.50; light copper, 35.00-36.25; re-y brass (60% copper) per dry copper con-36.00.

INGOTMAKERS' BUYING PRICES
(Cents per pound, carlots, delivered)

er and Brass: No. 1 heavy copper and 39.00-40.00; No. 2 heavy copper and 37.50-38.50; light copper, 35.00-36.25; 1 composition borings, 32.00-32.50; No. 1 osition solids, 33.00; heavy yellow brass s, 22.00-23.00; yellow brass turnings, ; radiators, 25.50.

PLATING MATERIAL

.b. shipping point, freight allowed on tities)

ANODES

mium: Special or patented shapes, $1.70 lb.

per: Flat-rolled, 59.42-59.79, oval, 58.92, -10,000 lb; electrodeposited, 56.78, 2000-lb lots; cast 62.54, 5000-10,000 lb quanti-

el: Depolarized, less than 100 lb, $1.015; 499 lb, 99.50; 500-4999 lb, 95.50; 5000-99 lb, 93.50; 30,000 lb, 91.50. Carbonized, ct 3 cents a lb. All prices eastern delivery tive Jan. 1, 1955.

Bar or slab, less than 200 lb, $1.165; 499 lb, $1.15; 500-999 lb, $1.145; 1000 lb nore, $1.14.

: Balls, 21.00; flat tops, 21.00; flats, 5; ovals, 22.00, ton lots.

CHEMICALS

mium Oxide: $2.15 per lb, in 100-lb drums.

omic Acid: Less than 10,000 lb, 28.50; over 00 lb, 27.50.

per Cyanide: 100 lb, 85.25; 200 lb, 84.50; lb, 84.25; 400-900 lb, 85.50; 1000 lb, 81.50.

per Sulphate: 500-1900 lb, 17.90; 2000-5900 5.90; 6000 lb or more, 15.65.

kel Chloride: 100 lb, 46.50; 200 lb, 44.50; lb, 35.25; 400-4900 lb, 33.25; 5000-35,900 9.50; 10,000 lb and over, 38.50. All prices ern delivery, effective Jan. 1, 1955.

kel Sulphate: 100 lb, 38.25; 200 lb, 36.25; lb, 35.25; 400-4900 lb, 33.25; 5000-35,900 1.25; 36,000 lb, 30.25. All prices eastern very, effective Jan. 1, 1955.

er Cyanide: (Cents per ounce) 4-oz bottle, 75; 16-oz bottle, 85.625; 80-oz bottle, 25; 100-oz bottle, 83.125; f.o.b. St. Louis, York and Los Angeles. Effective Sept. 1955.

ium Cyanide: Egg, under 1000 lb, 19.80; -19,900 lb, 18.80; 20,000 lb and over, 0; granular, add 1-cent premium to above.

ium Stannate: Less than 100 lb, 73.50; 100-lb, 59.10; 700-1900 lb, 56.60; 2000-9900 4.80; 10,000 lb or more, 53.70.

nous Chloride (Anhydrous): Less than 50 $1.600; 50 lb, $1.260; 100-300 lb, $1.110; 900 lb, $1.086; 1000-1900 lb, $1.061; 2000-lb, $1.025; 5000-19,900 lb, 96.40; 20,000 r more, 90.30.

nous Sulphate: Less than 50 lb, $1.31; lb, $1.01; 100-1900 lb, 99.00; 2000 lb or e, 97.00.

Cyanide: Under 1000 lb, 54.30; 1000 lb over, 52.30.

Norgren

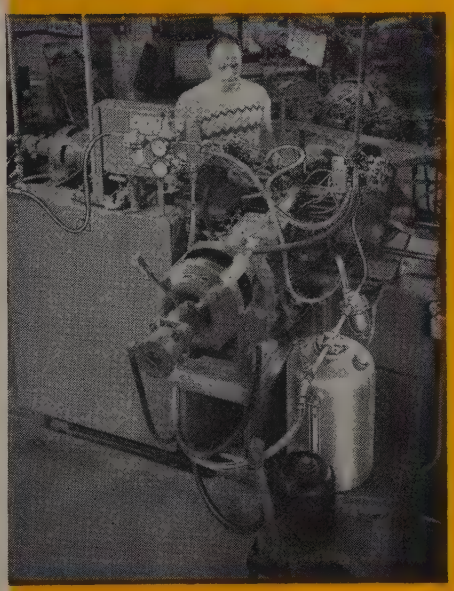
Spray-Lube System

ON TAPPING MACHINE

PRODUCED 4 COST-SAVING RESULTS for A-P CONTROLS CORP.

- increased tap life
- increased tapping speed
- eliminated problems of chips plugging coolant lines
- eliminated messy condition of splashing coolant

Machine taps 12 holes of various sizes simultaneously. Norgren Spray-Lube System includes 5 gal. tank, 12 mixing valves and spray nozzles. Air and fluid line pressures are 42 psi and 44 psi, respectively.



A-P adds 3 more
Since this installation A-P Controls has added Spray-Lube to three other machines.

Write for Norgren Blueprint No. SL-4 and let your Norgren Sales Representative show you what Spray-Lube can do for you.

OIL FOG LUBRICATORS
PRESSURE REGULATORS
AIR FILTERS, VALVES
HOSE ASSEMBLIES

C. A. Norgren CO.
3412 So. Elati, Englewood, Colo.

Steel Prices

Mill prices as reported to STEEL, cents per pound except as otherwise noted. *Changes shown in italics.* Code numbers following mill points indicate producing company. Key on page 133. Key to footnotes, Page 135.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)

Munhall,Pa. U5 .....$65.50

INGOTS, Alloy (NT)

Detroit R7 .....$69.00
Houston S5 .....74.00
Midland,Pa. C18 .....69.00
Munhall,Pa. U5 .....69.00

BILLETS, BLOOMS & SLABS Carbon, Rerolling (NT)

Aliquippa,Pa. J5 ....$68.50
Bessemer,Pa. U5 ....68.50
Bridgeport,Conn. N19..73.50
Buffalo R2 .....68.50
Clairton,Pa. U5 .....68.50
Ensley,Ala. T2 .....68.50
Fairfield,Ala. T2 .....68.50
Fontana,Calif. K1 ....76.00
Gary, Ind. U5 .....68.50
Johnstown,Pa. B2 ....68.50
Lackawanna,N.Y. B2 ..68.50
LoneStar,Tex. L6 ....74.50
Munhall, Pa. U5 .....68.50
Pittburgh J5 .....68.50
S.Chicago,Ill. R2, U5..68.50
S.Duquesne,Pa. U5 ...68.50
Youngstown R2 .....68.50

Carbon, Forging (NT)

Aliquippa,Pa. J5 ....$84.50
Bessemer,Pa. U5 .....84.50
Bridgeport,Conn. N19..89.50
Buffalo R2 .....84.50
Canton,O. R2 .....86.50
Clairton,Pa. U5 .....84.50
Conshohocken,Pa. A3..89.50
Ensley,Ala. T2 .....84.50
Fairfield,Ala. T2 .....84.50
Fontana,Calif. K1 ....92.00
Gary,Ind. U5 .....84.50
Geneva,Utah C11 .....84.50
Houston S5 .....89.50
Johnstown,Pa. B2 ....84.50
Lackawanna,N.Y. B2..84.50
Los Angeles B3 .....94.00
Midland,Pa. C18 .....84.50
Munhall,Pa. U5 .....84.50
Pittsburgh J5 .....84.50
Seattle B3 .....98.00
S.Chicago R2,U5,W14..84.50
S.Duquesne,Pa. U5 ....84.50
S.SanFrancisco B3 ....94.00

Alloy, Forging (NT)

Bethlehem,Pa. B2 ...$96.00
Buffalo R2 .....96.00
Canton,O. R2, T7 ...96.00
Conshohocken,Pa. A3..103.00
Detroit R7 .....96.00
Fontana,Calif. K1 ....115.00
Gary,Ind. U5 .....96.00
Houston S5 .....101.00
Ind.Harbor,Ind. Y1 ...96.00
Johnstown,Pa. B2 ....96.00
Lackawanna,N.Y. B2 ..96.00
LosAngeles B3 .....116.00
Massillon,O. R2 .....96.00
Midland,Pa. C18 .....96.00
Munhall,Pa. U5 .....96.00
S.Chicago R2,U5,W14..96.00
S.Duquesne,Pa. U5 ...96.00
Struthers,O. Y1 .....96.00
Warren,O. C17 .....96.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2 .....$103.50
Canton,O. R2 .....103.50
Cleveland R2 .....103.50
Gary,Ind. U5 .....103.50
S.Chicago R2, W14 ...103.50
S.Duquesne,Pa. U5 ...103.50

SKELP

Aliquippa,Pa. J5 ....4.325
LoneStar,Tex. L6 ....4.625
Munhall,Pa. U5 .....4.225
SparrowsPoint,Md. B2..4.225
Warren,O. R2 .....4.225
Youngstown R2, U5 ...4.225

WIRE RODS

AlabamaCity,Ala. R2 ..5.025
Aliquippa,Pa. J5 .....5.025
Alton,Ill. L1 .....5.20
Buffalo B11, W12 ....5.025
Cleveland A7 .....5.025
Donora,Pa. A7 .....5.025
Fairfield,Ala. T2 .....5.025
Houston S5 .....5.275
IndianaHarbor,Ind. Y1.5.025
Johnstown,Pa. B2 ....5.025
Joliet,Ill. A7 .....5.025
KansasCity,Mo. S5 ....5.275
Kokomo,Ind. C16 .....5.125
LosAngeles B3 .....5.825
Minnequa,Colo. C10 ...5.275
Monessen,Pa. P7 .....5.025
N.Tonawanda,N.Y. B11.5.025
Pittsburg,Calif. C11 ...5.675
Portsmouth P12 .....5.025
Roebling,N.J. R5 .....5.125
S.Chicago,Ill. R2 .....5.025
SparrowsPoint,Md. B2..5.125
Sterling,Ill.(1) N15 ....5.025
Sterling,Ill. N15 .....5.125
Struthers,O. Y1 .....5.025
Worcester,Mass. A7 ...5.325

STRUCTURALS

Carbon Steel Std. Shapes

Ala.City,Ala. R2 .....4.60
Aliquippa,Pa. J5 .....4.60
Bessemer,Ala. T2 .....4.60
Bethlehem,Pa. B2 .....4.65
Birmingham C15 .....4.60
Clairton,Pa. U5 .....4.60
Fairfield,Ala. T2 .....4.60
Fontana,Calif. K1 .....5.25
Gary,Ind. U5 .....4.60
Geneva,Utah C11 .....4.60
Houston S5 .....4.70
Ind.Harbor,Ind. I-2 ....4.60
Johnstown,Pa. B2 ....4.65
KansasCity,Mo. S5 ....4.70
Lackawanna,N.Y. B2 ...4.65
LosAngeles B3 .....5.30
Minnequa,Colo. C10 ....4.90
Munhall,Pa. U5 .....4.60
Niles,Calif. P1 .....4.90
Portland,Oreg. O4 ....5.35
Phoenixville,Pa. P4 ....5.15
Seattle B3 .....5.35
S.Chicago U5, W14 ....4.60
S.SanFrancisco B3 ....5.25
Torrance,Calif. C11 ....5.30
Weirton,W.Va. W6 ....4.60

Wide Flange

Bethlehem,Pa. B2 .....4.65
Clairton,Pa. U5 .....4.60
Fontana,Calif. K1 ....5.40
Lackawanna,N.Y. B2 ...4.65
Munhall,Pa. U5 .....4.60
Phoenixville,Pa. P4 ....5.15
S.Chicago,Ill. U5 .....4.60

Alloy Std. Shapes

Clairton,Pa. U5 .....5.65
Fontana,Calif. K1 .....7.30
Gary,Ind. U5 .....5.65
Houston S5 .....5.75
Munhall,Pa. U5 .....5.65
S.Chicago,Ill. U5 .....5.65

H.S., L.A. Std. Shapes

Aliquippa,Pa. J5 .....6.75
Bessemer,Ala. T2 .....6.75
Bethlehem,Pa. B2 .....6.80
Clairton,Pa. U5 .....6.75
Fairfield,Ala. T2 .....6.75
Fontana,Calif. K1 ....7.40
Gary,Ind. U5 .....6.75
Geneva,Utah C11 .....6.75
Houston S5 .....6.85
Ind.Harbor,Ind. I-2, Y1.6.75
Johnstown,Pa. B2 .....6.80
KansasCity,Mo. S5 ....6.85
Lackawanna,N.Y. B2 ..6.80
LosAngeles B3 .....7.45
Munhall,Pa. U5 .....6.75
Seattle B3 .....7.50
S.Chicago,Ill. U5, W14..6.75
S.SanFrancisco B3 ....7.40
Struthers,O. Y1 .....6.75

H.S., L.A. Wide Flange

Bethlehem,Pa. B2 ....6.80
Lackawanna,N.Y. B2 ..6.80
Munhall,Pa. U5 .....6.75
S.Chicago,Ill. U5 .....6.75

PILING

BEARING PILES

Bethlehem,Pa. B2 .....4.65
Lackawanna,N.Y. B2 ..4.65
Munhall,Pa. U5 .....4.60
S.Chicago,Ill. U5 .....4.60

STEEL SHEET PILING

Ind.Harbor,Ind. I-2 ....5.45
Lackawanna,N.Y. B2 ...5.45
Munhall,Pa. U5 .....5.45
S.Chicago,Ill. U5 .....5.45

PLATES

PLATES, Carbon Steel

Ala.City,Ala. R2 .....4.50
Aliquippa,Pa. J5 .....4.50
Ashland,Ky.(15) A10 ...4.50
Bessemer,Ala. T2 .....4.50
Bridgeport,Conn. N19 ..4.75
Buffalo R2 .....4.50
Clairton,Pa. U5 .....4.50
Claymont,Del. C22 ....4.80
Cleveland J5, R2 .....4.60
Coatesville,Pa. L7 ....4.80
Conshohocken,Pa. A3 ..4.50
Detroit M1 .....4.60
Ecorse,Mich. G5 .....4.60
Fairfield,Ala. T2 .....4.50
Fontana,Calif.(30) K1 ..5.15
Gary,Ind. U5 .....4.50
Geneva,Utah C11 .....4.50
GaniteCity,Ill. G4 ....4.70
Harrisburg,Pa. P4 .....5.10
Houston S5 .....4.60
Ind.Harbor,Ind. I-2, Y1.4.50
Johnstown,Pa. B2 ....4.50
Lackawanna,N.Y. B2 ...4.50
LoneStar,Tex. L6 .....4.85
Mansfield,O. E6 .....4.50
Minnequa,Colo. C10 ....5.35
Munhall,Pa. U5 .....4.50
Newport,Ky. N9 .....4.50
Pittsburgh J5 .....4.50
Riverdale,Ill. A1 .....4.50
Seattle B3 .....5.40
Sharon,Pa. S3 .....4.50
S.Chicago R2, U5, W14.4.50
SparrowsPoint,Md. B2 ..4.50
Steubenville,O. W10 ....4.50
Warren,O. R2 .....4.50
Weirton,W.Va. W6 ....4.50
Youngstown R2, U5, Y1.4.50

PLATES, Carbon Abras. Resist.

Claymont,Del. C22 .....5.65
Fontana,Calif. K1 .....6.30
Geneva,Utah C11 .....5.65
Johnstown,Pa. B2 .....5.65
SparrowsPoint,Md. B2 .5.65

PLATES, Wrought Iron

Economy,Pa. B14 ....10.40

PLATES,High-Strength Low-Alloy

Aliquippa,Pa. J5 .....6.725
Bessemer,Ala. T2 .....6.725
Clairton,Pa. U5 .....6.725
Cleveland J5, R2 ....6.725
Claymont,Del. C22 ....6.725
Coatesville,Pa. L7 ....6.725
Conshohocken,Pa. A3 ..6.725
Ecorse,Mich. G5 .....6.825
Fairfield,Ala. T2 .....6.725
Fontana,Calif.(30) K1 .7.375
Gary,Ind. U5 .....6.725
Geneva,Utah C11 .....6.725
Houston S5 .....6.825
Ind.Harbor,Ind. I-2, Y1.6.725
Johnstown,Pa. B2 ....6.725
LosAngeles B3 .....7.625
Munhall,Pa. U5 .....6.725
Pittsburgh J5 .....6.725
Seattle B3 .....7.625
Sharon,Pa. S3 .....6.725
S.Chicago,Ill. U5, W14.6.725
SparrowsPoint,Md. B2..6.725
Youngstown U5, Y1 ...6.725

PLATES, Alloy

Bridgeport,Conn. N19 ...6.55
Claymont,Del. C22 ....6.30
Coatesville,Pa. L7 .....6.30
Fontana,Calif. K1 .....6.95
Gary,Ind. U5 .....6.30
Houston S5 .....6.40
Ind.Harbor,Ind. Y1 ....6.30
Johnstown,Pa. B2 .....6.30
Munhall,Pa. U5 .....6.30
Newport,Ky. N9 .....6.30
Seattle B3 .....7.20
Sharon,Pa. S3 .....6.30
S.Chicago,Ill. U5, W14..6.30
SparrowsPoint,Md. B2 ..6.30
Youngstown Y1 .....6.30

FLOOR PLATES

Cleveland J5 .....5.575
Conshohocken,Pa. A3 ..5.575
Harrisburg,Pa. P4 ....5.575
Ind.Harbor,Ind. I-2 ....5.575
Munhall,Pa. U5 .....5.575
S.Chicago,Ill. U5 .....5.575

PLATES, Ingot Iron

Ashland c.l. (15) A10...4.75
Ashland l.c.l. (15) A10..5.25
Cleveland c.l. R2 .....5.10
Warren,O. c.l. R2 .....5.10

BARS

BARS, Hot-Rolled Carbon

Ala.City,Ala. R2 .....4.65
Aliquippa,Pa. J5 .....4.65
Alton,Ill. L1 .....4.85
Atlanta A11 .....4.85
Bessemer,Ala. T2 .....4.65
Birmingham C15 .....4.65
Bridgeport,Conn. N19 ..4.80
Buffalo R2 .....4.65
Canton,O. R2 .....4.75
Clairton,Pa. U5 .....4.65
Cleveland R2 .....4.65
Ecorse,Mich. G5 .....4.75
Emeryville,Calif. J7 ....5.40
Fairfield,Ala. T2 .....4.65
FairlessHills,Pa. U5 ....4.80
Fontana,Calif. K1 .....5.35
Gary,Ind. U5 .....4.65
Houston S5 .....4.90
Ind.Harbor,Ind. I-2, Y1.4.65
Johnstown,Pa. B2 .....4.65
Joliet,Ill. P22 .....4.65
KansasCity,Mo. S5 ....4.90
Lackawanna,N.Y. B2 ...4.65
LosAngeles B3 .....5.35
Massillon,O. R2 .....4.75
Midland,Pa. C18 .....4.65
Milton,Pa. M18 .....4.65
Minnequa,Colo. C10 ....5.10
Niles,Calif. P1 .....5.00
N.Tonawanda,N.Y. B11..4.65
Pittsburg,Calif. C11 ...5.35
Pittsburgh J5 .....4.65
Portland,Oreg. O4 .....5.40
Seattle B3, N14 .....5.40
S.Chicago R2, U5, W14..4.65
S.Duquesne,Pa. U5 ....4.65
S.SanFran.,Calif. B3 ....5.40
Sterling,Ill.(1) N15 ....4.65
Sterling,Ill. N15 .....4.75
Struthers,O. Y1 .....4.65
Torrance,Calif. C11 ....5.35
Warren,O. R2 .....4.65
Weirton,W.Va. W6 .....4.65
Youngstown R2, U5 ....4.65

BARS, H.R. Leaded Alloy

Warren,O. C17 .....6.325

BARS, Hot-Rolled Alloy

Bethlehem,Pa. B2 .....5.575
Bridgeport,Conn. N19 ..5.725
Buffalo R2 .....5.575
Canton,O. R2, T7 .....5.575
Clairton,Pa. U5 .....5.575
Detroit R7 .....5.575
Ecorse,Mich. G5 .....5.675
Fontana,Calif. K1 .....6.625
FairlessHills,Pa. U5 ....5.725
Gary,Ind. U5 .....5.575
Houston S5 .....5.825
Ind.Harbor,Ind. I-2,Y1.5.575
Johnstown,Pa. B2 .....5.575
KansasCity,Mo. S5 ....5.825
Lackawanna,N.Y. B2 ...5.575
LosAngeles B3 .....6.625
Massillon,O. R2 .....5.575
Midland,Pa. C18 .....5.575
S.Chicago, R2, U5, W14.5.575
S.Duquesne,Pa. U5 ....5.575
Struthers,O. Y1 .....5.575
Warren,O. C17 .....5.575
Youngstown U5 .....5.575

BARS & SMALL SHAPES, H.R. High-Strength Low-Alloy

Aliquippa,Pa. J5 .....6.80
Bessemer,Ala. T2 .....6.80
Bethlehem,Pa. B2 .....6.80
Clairton,Pa. U5 .....6.80
Cleveland R2 .....6.80
Ecorse,Mich. G5 .....6.90
Fairfield,Ala. T2 .....6.80
Fontana,Calif. K1 .....7.50
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
Ind.Harb.,Ind. I-2, Y1 ..6.80
Johnstown,Pa. B2 .....6.80
KansasCity,Mo. S5 ....7.05
Lackawanna,N.Y. B2 ...6.80
LosAngeles B3 .....7.50
Pittsburgh J5 .....6.80
Seattle B3 .....7.55
S.Chicago W14 .....6.80
S.Duquesne,Pa. U5 ....6.80
S.SanFrancisco B3 ....7.55
Struthers,O. Y1 .....6.80
Warren,O. R2 .....6.80
Youngstown U5 .....6.80

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa. B2 .....4.80

BAR SIZE ANGLES; S. Shapes

Aliquippa,Pa. J5 .....4.65
Atlanta A11 .....4.85
Fontana,Calif. K1 .....5.35
Niles,Calif. P1 .....5.00
Pittsburgh J5 .....
Portland,Oreg. O4 .....
SanFrancisco S7 .....

BAR SHAPES, Hot-Rolled

Clairton,Pa. U5 .....
Gary,Ind. U5 .....
Houston S5 .....
KansasCity,Mo. S5 ...
Youngstown U5 .....

BARS, C.F. Leaded Alloy

Ambridge,Pa. W18 ....
Camden,N.J. P13 ....
Chicago W18 .....
Cleveland C20 .....
Monaca,Pa. S17 .....
Newark,N.J. W18 ....
SpringCity,Pa. K3 ...
Warren,O. C17 .....

BARS, Cold-Finished Carb

Ambridge,Pa. W18 ...
BeaverFalls,Pa. M12, R2
Buffalo B5 .....
Camden,N.J. P13 .....
Carnegie,Pa. C12 .....
Chicago W18 .....
Cleveland A7, C20 ...
Detroit R7 .....
Detroit B5, P17 .....
Donora,Pa. A7 .....
Elyria,O. W18 .....
FranklinPark,Ill. N5 ..
Gary,Ind. R2 .....
GreenBay,Wis. F7 ...
Hammond,Ind. L2, M13
Hartford,Conn. R2 ...
Harvey,Ill. B5 .....
LosAngeles R2, S30 ...
Mansfield,Mass. B5 ...
Massillon,O. R2, R8 ...
Midland,Pa. C18 .....
Monaca,Pa. S17 .....
Newark,N.J. W18 ....
NewCastle,Pa.(17) B4 .
Pittsburgh J5 .....
Plymouth,Mich. P5 ...
Putnam,Conn. W18 ...
Readville,Mass. C14 ...
S.Chicago,Ill. W14 ...
SpringCity,Pa. K3 ....
Struthers,O. Y1 .....
Waukegan,Ill. A7 ....
Worcester,Mass. W19 .
Youngstown F3, Y1 ...

BARS, Cold-Finished Carb (Turned and Ground)

Cumberland,Md. C19 .

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 ....
BeaverFalls,Pa.M12,R2
Bethlehem,Pa. B2 .....
Buffalo B5 .....
Camden,N.J. P13 .....
Canton,O. T7 .....
Carnegie,Pa. C12 .....
Chicago W18 .....
Cleveland A7, C20 ....
Detroit R7 .....
Detroit B5, P17 .....
Donora,Pa. A7 .....
Elyria,O. W8 .....
Gary,Ind. R2 .....
GreenBay,Wis. F7 ....
Hammond,Ind. L2, M13.
Hartford,Conn. R2 ....
Harvey,Ill. B5 .....
Lackawanna,N.Y. B2 ...
LosAngeles S30 .....
Mansfield,Mass. B5 ...
Massillon,O. R2, R8 ...
Midland,Pa. C18 .....
Monaca,Pa. S17 .....
Newark,N.J. W18 ....
Plymouth,Mich. P5 ...
S.Chicago W14 .....
SpringCity,Pa. K3 ....
Struthers,O. Y1 .....
Warren,O. C17 .....
Waukegan,Ill. A7 ....
Worcester,Mass. A7 ...
Youngstown F3, Y1 ...

BARS, Reinforcing (To Fabricators)

Ala.City,Ala. R2 .....
Altanta A11 .....
Birmingham C15 .....
Buffalo R2 .....
Cleveland R2 .....
Ecorse,Mich. G5 .....
Emeryville,Calif. J7 ...
Fairfield,Ala. T2 .....
FairlessHills,Pa. U5 ...
Fontana,Calif. K1 .....
Ft.Worth,Tex.(42) T4 ..
Gary,Ind. U5 .....
Houston S5 .....

STE

.Harbor,Ind. I-2, Y1 4.65
nstown,Pa. B2 ..... 4.65
et,Ill. P22 ..... 4.65
nsasCity,Mo. S5 .... 4.90
kawanna,N.Y. B2 .. 4.65
Angeles B3 ..... 5.35
ton,Pa. M18 ..... 4.65
nequa,Colo. C10 .... 5.10
s,Calif. P1 ..... 5.00
sburg,Calif. C11 .... 5.35
sburgh J5 ..... 4.65
tland,Oreg. O4 ..... 5.40
dSprings,Okla, S5 .. 5.15
ttle B3, N14 ..... 5.40
hicago R2 ..... 4.65
uquesne,Pa. U5 .... 4.65
anFrancisco B3 .... 5.40
rrowsPoint,Md. B2 .. 4.65
rling,Ill.(1) N15 .... 4.65
rling,Ill. N15 ..... 4.75
uthers,O. Y1 ..... 4.65
rrance,Calif. C11 .... 5.35
ngstown R2, U5, Y1 4.65

S, Reinforcing Fabricated; to Consumers)

nstown,Pa. ¼-1" B2 6.15
nsasCity,Kans. S5 .. 6.45
kawanna,N.Y. B2 .. 6.17
rion,O. P11 ..... 5.90
sburgh U8 ..... 6.17
ttle B3, N14 ..... 6.60
rrowsPt. ½-1" B2 .. 6.15
liamsport, Pa. S19 .. 6.00

L STEEL BARS

s,Pa.(3) J8 ..... 4.25
cagoHts.(3) C2, I-2 .. 4.55
cagoHts.(4) C2, I-2 .. 4.65
Worth,Tex.(26) T4 .. 5.10
nklin,Pa. (3) F5 .... 4.55
nklin,Pa.(4) F5 .... 4.65
rion,O.(3) P11 ..... 4.50
ine,Ill.(3) R2 ..... 4.65
awanda(3) B12 .... 4.50
awanda(4) B12 .... 4.65
liamsport,Pa.(3) S19 4.65

S, Wrought Iron

nomy,Pa.(S.R.)B14 11.50
nomy,Pa(D.R.)B14 14.30
nomy(Staybolt)B14 14.65
K.Rks. (S.R.) L5 .. 11.50
K.Rks. (D.R.) L5 .. 16.00
K.Rks.(Staybolt) L5 17.00

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

Ala.City,Ala. R2 ..... 4.325
Allenport,Pa. P7 ..... 4.325
Ashland,Ky.(8) A10 .. 4.325
Cleveland J5, R2 .... 4.325
Conshohocken,Pa. A3 .. 4.375
Detroit(8) M1 ..... 4.425
Dravosburg,Pa. U5 .... 4.325
Ecorse,Mich. G5 ..... 4.425
Fairfield,Ala. T2 ..... 4.325
FairlessHills,Pa. U5 .. 4.375
Fontana,Calif. K1 .... 5.075
Gary,Ind. U5 ..... 4.325
Geneva,Utah C11 .... 4.425
GraniteCity,Ill. G4 .... 4.525
Ind.Harbor,Ind. I-2, Y1 4.325
Kokomo,Ind. C16 .... 4.425
Lackawanna,N.Y. B2 .. 4.325
Mansfield,O. E6, (37) .. 4.325
Munhall,Pa. U5 ..... 4.325
Newport,Ky.(8) N9 .. 4.325
Niles,O. N12 ..... 4.325
Pittsburg,Calif. C11 .. 5.025
Pittsburgh J5 ..... 4.325
Portsmouth,O. P12 .... 4.325
Riverdale,Ill. A1 ..... 4.325
Sharon,Pa. S3 ..... 4.325
S.Chicago,Ill. W14 .... 4.325
SparrowsPoint,Md. B2 4.325
Steubenville,O. W10 .. 4.325
Warren,O. R2 ..... 4.325
Weirton,W.Va. W6 .. 4.325
Youngstown U5, Y1 .. 4.325

SHEETS, H.R. (19 Ga. & Lighter)

Ala.City,Ala. R2 ..... 5.625
Kokomo,Ind. C16 .... 5.475
Niles,O. N12 ..... 5.325

SHEETS, H.R. Alloy

Ind.Harbor,Ind. Y1 .... 7.20
Youngstown Y1 ..... 7.20

SHEETS, H.R.(14 Ga. & Heavier) High-Strength Low-Alloy

Cleveland J5, R2 ..... 6.375
Conshohocken,Pa. A3 .. 6.425
Dravosburg,Pa. U5 .. 6.375
Ecorse,Mich. G5 .... 6.475
Fairfield,Ala. T2 .... 6.375
FairlessHills,Pa. U5 .. 6.425
Fontana,Calif. K1 .... 7.125
Gary,Ind. U5 ..... 6.375
Ind.Harbor,Ind. I-2, Y1 6.375
Lackawanna(35) B2 .. 6.375
Munhall,Pa. U5 ..... 6.375
Pittsburgh J5 ..... 6.375
Sharon,Pa. S3 ..... 6.375
S.Chicago,Ill. U5 ..... 6.375
SparrowsPoint(36) B2.. 6.375
Warren,O. R2 ..... 6.375
Weirton,W.Va. W6 .... 6.375
Youngstown U5, Y1 .... 6.375

SHEET, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 .. 4.575
Ind.Harbor,Ind. I-2 .. 4.575

SHEETS, Cold-Rolled Steel (Commercial Quality)

Allenport,Pa. P7 ..... 5.325
Cleveland J5, R2 .... 5.325
Conshohocken,Pa. A3 .. 5.375
Dravosburg,Pa. U5 .... 5.325
Detroit M1 ..... 5.325
Ecorse,Mich. G5 ..... 5.425
Fairfield,Ala. T2 ..... 5.325
FairlessHills,Pa. U5 .. 5.375
Follansbee,W.Va. F4 .. 5.325
Fontana,Calif. K1 .... 6.425
Gary,Ind. U5 ..... 5.325
GraniteCity, Ill. G4 .... 5.525
Ind.Harbor,Ind. I-2, Y1 5.325
Lackawanna,N.Y. B2 .. 5.325
Mansfield,O. E6 ..... 5.325
Middletown,O. A10 .... 5.325
Newport,Ky. N9 ..... 5.325
Pittsburg,Calf. C11 .. 6.275
Pittsburgh J5 ..... 5.325
Portsmouth,O. P12 .... 5.325
SparrowsPoint,Md. B2.. 5.325
Steubenville,O. W10 .. 5.325
Warren,O. R2 ..... 5.325
Weirton,W.Va. W6 .... 5.325
Youngstown Y1 ..... 5.325

SHEETS, Cold-Rolled High-Strength Low-Alloy

Cleveland J5, R2 ... 7.875
Dravosburg,Pa. U5 .. 7.875
Ecorse,Mich. G5 ..... 7.975
FairlessHills,Pa. U5 .. 7.925
Fontana,Calif. K1 .... 8.975
Gary,Ind. U5 ..... 7.875
IndianaHarbor,Ind. Y1 7.875
Lackawanna(37) B2 .. 7.875
Pittsburgh J5 ..... 7.875
SparrowsPoint(38) B2.. 7.875
Warren,O. R2 ..... 7.875
Weirton,W.Va. W6 .... 7.875
Youngstown Y1 ..... 7.875

SHEETS, Cold-Rolled Ingot Iron

Middletown,O. A10 .... 5.825

SHEETS, Culvert (16 Gage)	Cu Alloy	Cu Fe
Ashland,Ky.	A10.6.90	...
Canton,O.R2	....6.10	6.55
Dravosburg	U5 ..6.10	...
Fairfield	T2 ....6.10	...
Gary,Ind.	U5 ....6.10	6.35
Ind.Harbor	I-2 ..6.10	6.35
Kokomo,Ind.	C16..6.20	...
MartinsFry.	W10.6.10	...
Newport.Ky.	N9..6.10	6.35
Pitts.,Calif.	C11..6.85	...
SparrowsPt.	B2..6.10	...

SHEETS, Culvert—Pure Iron

Ashland,Ky. A10 ..... 7.15
Gary,Ind. U5 ..... 6.35
MartinsFry.,O. W10 .... 6.35

SHEETS, Galvanized Steel Hot-Dipped

Ala.City,Ala. R2 ..... 5.85‡
Ashland,Ky. A10 ..... 5.85†
Canton,O. R2 ..... 5.85‡
Delphos,O. N16 ..... 6.60‡
Dover,O. R1 ..... 5.85‡
Dravosburg,Pa. U5 ... 5.85†
Fairfield,Ala. T2 ..... 5.85†
Gary,Ind. U5 ..... 5.85*
GraniteCity,Ill. G4 .... 6.05
Ind.Harbor,Ind. I-2 ... 5.85†
Kokomo,Ind. C16 ..... 5.95‡
MartinsFerry,O. W10 .. 5.85*
Middletown,O. A10 .... 5.85†
Newport,Ky. N9 ..... 5.85‡
Niles,O. N12 ..... 6.85‡
Pittsburg,Calif. C1 .... 6.60*
SparrowsPt.,Md. B2 .. 5.85†
Steubenville,O. W10 .. 5.85‡
Warren,O. R2 ..... 5.85†
Weirton,W.Va. W6 .... 5.85*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana,Calif. K1 .... 6.575

SHEETS, Galvanized High-Strength Low-Alloy

Dravosburg,Pa. U5 .... 8.60
SparrowsPoint(39) B2 .. 8.60

SHEETS, Galvannealed Steel

Canton,O. R2 ..... 6.25
Dravosburg,Pa. U5 .... 6.25
Kokomo,Ind. C16 ..... 6.60
Newport,Ky. N9 ..... 6.25
Niles,O. N12 ..... 7.25

SHEETS, Galvanized Ingot Iron (Hot-dipped Continuous)

Ashland,Ky. A10 ..... 6.10
Middletown,O. A10 .... 6.10

SHEETS, Electrogalvanized

Cleveland(28) R2 ..... 6.70
Niles,O.(28) R2 ..... 6.70
Weirton,W.Va. W6 .... 6.55

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) .. 8.50
Butler,Pa. A10 (type 2) .. 8.60

SHEETS, Enameling Iron

Ashland,Ky. A10 ..... 5.90
Cleveland R2 ..... 5.90
Dravosburg,Pa. U5 .... 5.90
Gary,Ind. U5 ..... 5.90
GraniteCity,Ill. G4 .... 6.10
Ind.Harbor,Ind. I-2 .... 5.90
Middletown,O. A10 .... 5.90
Niles,O. N12 ..... 5.90
Youngstown Y1 ..... 5.90

BLUED STOCK, 29 Gage

Follansbee,W.Va. F4 ... 7.75
Ind.Harbor,Ind. I-2 .... 7.75
Yorkville,O. W10 ..... 7.75

SHEETS, Long Terne Steel (Commercial Quality)

BeechBottom,W.Va. W10 6.25
Gary,Ind. U5 ..... 6.25
Mansfield,O. E6 ..... 6.25
Middletown,O. A10 .... 6.25
Niles,O. N12 ..... 6.25
Weirton,W.Va. W6 .... 6.25

SHEETS, Long Terne, Ingot Iron

Middletown, O. A10 ... 6.65

Key to Producers

Acme Steel Co.
Alan Wood Steel Co.
Allegheny Ludlum Steel
Alloy Metal Wire Div., H. K. Porter Co. Inc.
American Shim Steel Co.
American Steel & Wire Div., U. S. Steel Corp.
Anchor Drawn Steel Co.
Angell Nail & Chaplet
Armco Steel Corp.
Atlantic Steel Co.

Babcock & Wilcox Co.
Bethlehem Steel Co.
Beth. Pac. Coast Steel
Blair Strip Steel Co.
Bliss & Laughlin Inc.
Braeburn Alloy Steel
Brainard Steel Div., Sharon Steel Corp.
E. & G. Brooke, Wickwire Spencer Steel Div. Colo. Fuel & Iron
Buffalo Bolt Co., Div., Buffalo-Eclipse Corp.
Buffalo Steel Division H. K. Porter Co. Inc.
A. M. Byers Co.
J. Bishop & Co.

Calstrip Steel Corp.
Calumet Steel Div. Borg-Warner Corp.
Carpenter Steel Co.
Cleve. Cold Rolling Mills
Cold Metal Products Co.
Colonial Steel Co.
Colorado Fuel & Iron
Columbia-Geneva Steel
Columbia Steel & Shaft.
Columbia Tool Steel Co.
Compressed Steel Shaft.
Connors Steel Div. H. K. Porter Co. Inc.
Continental Steel Corp.
Copperweld Steel Co.
Crucible Steel Co.
Cumberland Steel Co.

C20 Cuyahoga Steel & Wire
C22 Claymont Steel Products Dept. Wickwire Spencer Steel Division
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel Div., Sharon Steel Corp.
D4 Disston & Sons, Henry
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div. Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G2 Globe Iron Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins, E., Steel Tube
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M13 Monarch Steel Div., Jones & Laughlin Steel Corp.
M14 McInnes Steel Co.
M16 Md. Fine & Special. Wire
M17 Metal Forming Corp.
M18 Milton Steel Prod. Div., Merritt-Chapman&Scott

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 NewEng.HighCarb.Wire
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N12 Niles Rolling Mill Div. Sharon Steel Corp.
N14 Northwest.SteelRoll.Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.
N19 Northeastern Steel Corp.

O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co. Sub. of Barium Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Division Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 RelianceDiv.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Div., Armco Steel Corp
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service

T2 Tenn. Coal & Iron Div. U. S. Steel Corp.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Division, Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
T13 Tube Methods Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div. U. S. Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Division, H. K. Porter Co. Inc.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Whickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
W19 Worcester Pressed Steel

Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ..4.325
Allenport,Pa. P7 .....4.325
Alton,Ill. L1 .....4.50
Ashland,Ky.(8) A10 ..4.325
Atlanta A11 .....4.525
Bessemer,Ala. T2 ....4.325
Birmingham C15 .....4.325
Bridgeport,Conn. N19..4.625
Buffalo(27) R2 .....4.325
Conshohocken,Pa. A3 ..4.375
Detroit M1 .....4.425
Ecorse,Mich. G5 .....4.425
Fairfield,Ala. T2 ....4.325
Fontana,Calif. K1 ....5.075
Gary,Ind. U5 .....4.325
Ind.Harbor,Ind. I-2, Y1.4.325
Johnstown,Pa.(25) B2..4.325
Lackaw'na,N.Y.(24) B2 4.325
LosAngeles(25) B3 ....5.075
Milton,Pa. M18 .....4.325
Minnequa,Colo. C10 ..5.425
NewBritain(10) S15 ..4.325
N.Tonawanda,N.Y. B11 4.325
Pittsburg,Calif. C11 ..5.075
Portsmouth,O. P12 ....4.325
Riverdale,Ill. A1 .....4.325
SanFrancisco S7 .....5.05
Seattle(25) B3 .....5.325
Seattle N14 .....5.40
Sharon,Pa. S3 .....4.325
S.Chicago, Ill. W14 ...4.325
S.SanFrancisco(25) B3.5.075
SparrowsPoint,Md. B2..4.325
Sterling(1) N15 .....4.325
Sterling,Ill. N15 .....4.425
Torrance,Calif. C11 ..5.075
Warren,O. R2 .....4.325
Weirton W.Va. W6 ....4.325
Youngstown U5 .....4.325

STRIP, Hot-Rolled Alloy

Bridgeport,Conn. N19 ..7.50
Carnegie,Pa. S18 .....7.20
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....7.20
Ind.Harbor,Ind. Y1 ....7.20
LosAngeles B3 .....8.40
Newport,Ky. N9 .....7.20
Sharon,Pa. S3 .....7.20
S.Chicago W14 .....7.20
Youngstown U5, Y1 ....7.20

STRIP, Hot-Rolled High-Strength Low-Alloy

Bessemer,Ala. T2 ....6.425
Conshohocken,Pa. A3 ..6.425
Ecorse,Mich. G5 .....6.525
Fairfield,Ala. T2 ....6.425
Fontana,Calif. K1 ....7.525
Gary,Ind. U5 .....6.425
Houston S5 .....6.675
Ind.Harbor,Ind. I-2, Y1 6.425
KansasCity,Mo. S5 ....6.675
Lackawanna,N.Y. B2 ..6.425
LosAngeles(25) B3 ....7.175
Seattle(25) B3 .....7.425
Sharon,Pa. S3 .....6.425
S.SanFrancisco(25) B3.7.175
SparrowsPoint,Md. B2..6.425
Warren,O. R2 .....6.425
Weirton,W.Va. W6 ....6.425
Youngstown U5, Y1 ..6.425

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ..4.575

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....6.25
Baltimore T6 .....6.25
Boston T6 .....6.80
Buffalo S40 .....6.25
Cleveland J5 .....6.25
Cleveland A7 .....6.25
Conshohocken,Pa. A3 ...6.30
Dearborn,Mich. D3 ....6.35
Detroit D2, M1, P20 ...6.35
Dover,O. G6 .....6.25
Ecorse,Mich. G5 .....6.35
Follansbee,W.Va. F4 ...6.25
Fontana,Calif. K1 .....8.00
Franklin Park,Ill. T6 ..6.35
Ind.Harbor,Ind. I-2 ...6.35
Ind.Harbor,Ind. Y1 ....6.25
Indianapolis C8 .....6.40
Lackawanna,N.Y. B2 ...6.25
LosAngeles C1 .....8.50
NewBedford,Mass. R10..6.70
NewBritain(10) S15 ...6.25
NewCastle,Pa. B4, E5..6.25
NewHaven,Conn. A7....7.00
NewHaven,Conn. D2....6.70
NewKensington,Pa. A6..6.25
Pawtucket,R.I. R3 ....6.90
Pawtucket,R.I. N8 ....6.80
Pittsburgh J5 .....6.25
Portsmouth,O. P12 ....6.25
Riverdale,Ill. A1 .....6.35
Rome,N.Y. (32) R6 ....6.25
Sharon,Pa. S3 .....6.25
SparrowsPt.,Md. B2 ....6.25
Trenton,N.J. (31) R5 ...7.80
Wallingford,Conn. W2 ..6.70
Warren,O. R2, T5 ....6.25
Weirton,W.Va W6 ....6.25
Worcester,Mass. A7 ....7.10
Youngstown Y1 .....6.25
Youngstown C8 .....6.25

STRIP, Cold-Rolled Alloy

Boston T6 .....13.80
Carnegie,Pa. S18 ....13.45
Cleveland A7 .....13.45
Dover,O. G6 .....13.45
FranklinPark,Ill. T6 ..13.45
Harrison,N.J. C18 ....13.45
Indianapolis C8 .....13.60
Pawtucket,R.I. N8 ....13.80
Sharon,Pa. S3 .....13.45
Worcester,Mass. A7 ...13.75
Youngstown C8 .....13.45

STRIP, Cold-Rolled High-Strength Low-Alloy

Cleveland A7 .....9.10
Dearborn,Mich. D3 ....9.20
Dover,O. G6 .....9.30
Ecorse,Mich. G5 .....9.20

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	7.30	9.25	10.80	12.95	15.65
Boston T6	7.55	9.25	10.80	12.95	15.65
Bristol,Conn. W1	...	...	10.80	12.95	15.65
Carnegie, Pa. S18	...	8.95	10.50	12.65	....
Cleveland A7	7.00	8.95	10.50	12.65	15.35
Cleveland C7	...	8.95	10.50	12.65	15.35
Dearborn,Mich. D3	7.10	9.05	10.60	....	....
Detroit D2	7.10	9.05	10.60	12.75	....
Dover,O. G6	7.00	8.95	10.50	12.65	15.35
Follansbee,W.Va. F4	7.00	8.95	10.50**	....	....
FranklinPark,Ill. T6	7.10	8.95	10.50	12.65	15.35
Harrison,N.J. C18	...	...	10.80	12.95	15.65
Indianapolis C8	7.15	9.10	10.50	12.65	15.35
NewBritain,Conn.(10) S15.	7.00	8.95	10.50	12.65	15.35
NewCastle,Pa. B4, E5	7.00	8.95	10.50	12.65	....
NewHaven,Conn. D2	7.45	9.25	10.80	12.95	....
NewKensington,Pa. A6	7.00	8.95	10.50	....	....
New York W3	...	9.25	10.80	12.95	15.65
Pawtucket,R.I. N8	7.55	9.25	10.80	12.95	15.35
Riverdale,Ill. A1	7.10	8.95	10.50	12.65	15.35
Rome,N.Y.(32) R6	7.00	8.95	10.50	12.65	15.35
Sharon,Pa. S3	7.00	8.95	10.50	12.65	15.35
Trenton,N.J. R5	...	9.25	10.80	12.95	15.65
Wallingford,Conn. W2	7.45	9.25	10.80	12.95	15.65
Warren,O. T5	7.00	8.95	10.50	12.65	15.35
Weirton,W.Va. W6	7.00	8.95	10.50	12.65	15.35
Worcester,Mass. T6	7.55	9.25	10.80	12.95	15.65
Worcester,Mass. A7	7.85	9.25	10.80	12.95	15.65
Youngstown C8	7.00	8.95	10.50	12.65	15.35
Spring Steel (Tempered)					
Bristol,Conn. W1	...	...	14.40	17.60	....
Buffalo, W12	...	...	14.40	....	....
FranklinPark,Ill. T6	...	...	14.90	18.10	21.50
Harrison,N.J. C18	...	...	14.40	17.60	21.00
NewYork W3	...	...	14.40	17.60	21.00
Trenton,N.J. R5	...	...	14.40	17.60	21.00
Worcester,Mass. A7, T6	...	...	14.40	17.60	21.00
Worcester,Mass. W12	...	...	14.40	....	....
Youngstown C8	...	...	14.75	17.95	21.35

**0.065 C, max.

Ind.Harbor,Ind. Y1 ....9.30
Lackawanna,N.Y. B2 ..9.10
Sharon,Pa. S3 .....9.10
SparrowsPoint,Md. B2 ..9.10
Warren,O. R2 .....9.10
Weirton,W.Va. W6 ....9.10
Youngstown Y1 .....9.30

STRIP, Electrogalvanized

Cleveland A7 .....6.25*
Dover,O. G6 .....6.25*
Riverdale,Ill. A1 .....6.55*
Youngstown C8 .....6.25*
Warren,O. T5 .....6.25*
Warren,O. B9 .....6.45*
Weirton,W.Va. W6 ....5.75*
Worcester,Mass. A7 ...7.10*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Sharon,Pa. S3 .....6.55

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.05
Riverdale,Ill. A1 .....4.90
Sharon,Pa. S3 .....4.75
Youngstown U5 .....4.75

SILICON STEEL

H.R. SHEETS(22 Ga.,cut lengths)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10 ..	...	...	9.95	10.95	11.85
Brackenridge,Pa. A4	...	...	9.95	10.95	11.85
Mansfield,O. E6	8.40	9.35	9.95	10.95	11.85
Newport,Ky. N9	8.40	9.35	9.95	10.95	11.85
Niles,O. N12	8.40	9.35	9.95	10.95	....
Vandergrift,Pa. U5	...	9.35	9.95	10.95	11.85
Warren,O. R2	8.40	9.35	9.95	10.95	11.85
Zanesville,O. A10	...	9.35	9.95	10.95	11.85

C.R. COILS & CUT LENGTHS, (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
Brackenridge,Pa. A4	...	...	10.70	11.70	12.60
GraniteCity,Ill. G4	8.80*	9.80*	10.40*	11.40*	....
IndianaHarbor,Ind. I-2 ..	8.60†	9.60*	10.20*	11.20*	....
Vandergrift,Pa. U5	...	10.10†	10.70†	11.70†	12.60†
Vandergrift,Pa. U5	8.60*	9.60*	10.20*	11.20*	12.10*
Warren,O. R2	8.60†	10.10	10.70	11.70	12.60
Zanesville,O. A10	...	10.10	10.70	11.70	12.60

H.R. SHEETS (22 Ga., cut lengths)	Transformer Grade T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	12.80	13.35	13.85	14.85
Brackenridge,Pa. A4	12.80	....	....	....
Newport,Ky. N9	12.80	....	....	....
Vandergrift,Pa. U5	12.80	13.35	13.85	14.85
Zanesville,O. A10	12.80§	13.35§	13.85§	14.85§

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-72
Brackenridge,Pa. A4	....	15.85	17.45	17.95	13.55§
Butler,Pa. A10	...	....	17.45	17.95	....
Vandergrift,Pa. U5	14.85	15.85	17.45	17.95	13.55
Warren,O. R2	....	....	....	....	13.55‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed, semiprocessed ½c lower. §Coils, ¾-cent higher.

TIN MILL PRODUCTS

TIN PLATE Electrolytic (Base Box)	0.25 lb	0.50 lb	0.7
Aliquippa,Pa. J5	$7.90	$8.15	$
Dravosburg,Pa. U5	7.90	8.15	
Fairfield,Ala. T2	8.00	8.25	
FairlessHills,Pa. U5	8.00	8.25	
Gary,Ind. U5	7.90	8.15	
GraniteCity,Ill. G4	8.00	8.25	
IndianaHarbor,Ind. I-2, Y1	7.90	8.15	
Niles,O. R2	7.90	8.15	
Pittsburg,Calif. C11	8.65	8.90	
SparrowsPoint,Md. B2	8.00	8.25	
Weirton,W.Va. W6	7.90	8.15	
Yorkville,O. W10	7.90	8.15	
ELECTROTIN (22-27 Gage; Dollars per 100 lb)			
Aliquippa,Pa. J5	6.575	....	
Niles,O. R2	7.075	7.275	7

TINPLATE, American Coke (Base Box)	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$9.20	$9.45
Dravosburg,Pa. U5	9.20	9.45
Fairfield,Ala. T2	9.30	9.55
Fairless,Pa. U5	9.30	9.55
Gary,Ind. U5	9.20	9.45
Ind.Har. I-2, Y1	9.20	9.45
Pitts.,Calif. C11	9.95	10.20
Sp.Pt.,Md. B2	9.30	9.55
Weirton,W.Va. W6	9.20	9.45
Yorkville,O. W10	9.20	9.45

BLACK PLATE, (Base Box)

Aliquippa,Pa. J5 .....$7.00
Dravosburg,Pa. U5 ....7.00
Fairfield,Ala. T2 .....7.10
FairlessHills,Pa. U5 ...7.10
Gary,Ind. U5 .....7.00
GraniteCity,Ill. G4 ...7.10
Ind.Harbor,Ind. I-2, Y1 7.00
Niles,O. R2 .....7.00
Pittsburg,Calif. C11 ...7.75
SparrowsPoint,Md. B2 ..
Warren,O. R2 .....
Weirton,W.Va. W6 ....
Yorkville,O. W10 .....

HOLLOWARE ENAMELING Black Plate (29 Gage)

Dravosburg,Pa. U5 ..
Gary,Ind. U5 .....
GraniteCity,Ill. G4 ....
Ind.Harbor,Ind. Y1 ....
Yorkville,O. W10 .....

MANUFACTURING TERNES (Special Coated; Base Bo

Dravosburg,Pa. U5 ..$
Gary,Ind. U5 .....

MANUFACTURING TERNES (Light Coated, 6 lb; Base

Yorkville,O. W10 .....$

ROOFING SHORT TERNES (8 lb Coated; Base Box)

Gary,Ind. U5 .....$1

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ..6.25
Aliquippa,Pa. J5 .....6.25
Alton,Ill. L1 .....6.425
Atlanta A11 .....6.45
Bartonville,Ill. K4 ....6.35
Buffalo W12 .....6.25
Chicago W13 .....6.25
Cleveland A7 .....6.25
Crawfordsville,Ind. M8..6.35
Donora,Pa. A7 .....6.25
Duluth,Minn. A7 .....6.25
Fairfield,Ala. T2 .....6.25
Fostoria,O.(24) S1 ....6.45
Houston S5 .....6.50
Jacksonville,Fla. M8 ...6.77
Johnstown,Pa. B2 .....6.25
Joliet,Ill. A7 .....6.25
KansasCity,Mo. S5 ....6.50
Kokomo,Ind. C16 .....6.35
LosAngeles B3 .....7.20
Minnequa,Colo. C10 ....6.50
Monessen,Pa. P7 .....6.25
Newark 6-8 ga. I-1 ....6.90
N. Tonawanda B11 ....6.25
Palmer,Mass. W12 ....6.55
Pittsburg,Calif. C11 ...7.20
Portsmouth,O. P12 ....6.25
Rankin,Pa. A7 .....6.25
S.Chicago,Ill. R2 .....6.25
S.SanFrancisco C10 ....7.20
SparrowsPoint,Md. B2 ..6.35
Sterling,Ill.(1) N15 ....6.25
Sterling,Ill. N15 .....6.35
Struthers,O. Y1 .....6.25
Waukegan,Ill. A7 .....6.25
Worcester,Mass. A7 ....6.55

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5 .....7.90
Alton,Ill. L1 .....8.075
Bartonville,Ill. K4 .....8.00
Buffalo W12 .....7.90
Cleveland A7 .....7.90
Donora,Pa. A7 .....7.90
Duluth,Minn. A7 .....7.90
Fostoria,O. S1 .....7.95
Johnstown,Pa. B2 .....7.90
LosAngeles B3 .....8.85
Milbury,Mass.(12) N6 ..8.20
Minnequa,Colo. C10 ....8.15
Monessen,Pa. P16 .....7.90
Muncie,Ind. I-7 .....8.10
Palmer,Mass. W12 ....8.20
Pittsburg,Calif. C11 ...8.85
Portsmouth,O. P12 ....7.90
Roebling,N.J. R5 .....8.20
S.Chicago,Ill. R2 .....7.90
S.SanFrancisco C10 ....8.85
SparrowsPt.,Md. B2 ...8.00
Struthers,O. Y1 .....7.90
Trenton,N.J. A7 .....8.20
Waukegan,Ill. A7 .....7.90
Worcester A7,J4,T6,W12.8.20

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....7.60
Alton,Ill. L1 7
Buffalo W12 .....
Cleveland A7 .....
Donora,Pa. A7 .....
Duluth,Minn. A7 .....
Johnstown,Pa. B2 .....
KansasCity,Mo. S5 .....
LosAngeles B3 .....
Minnequa,Colo. C10 7
Monessen,Pa. P16 .....
NewHaven,Conn. A7 ..
Palmer,Mass. W12 ....
Pittsburg,Calif. C11 ....
S.Chicago,Ill. R2 .....
S.SanFrancisco C10 ....
SparrowsPoint,Md. B2 ..
Struthers,O. Y1 .....
Trenton,N.J. A7 .....
Waukegan,Ill. A7 .....
Worcester,Mass. A7 ....

WIRE, Fine & Weaving(8" C

Alton,Ill. L1 12
Bartonville,Ill. K4 1
Buffalo W12 1
Chicago W13 1
Cleveland A7 1
Crawfordsville,Ind. M8.1
Fostoria,O. S1 1
Jacksonville,Fla. M8 ..1
Johnstown,Pa. B2 1
Kokomo,Ind. C16 1
Minnequa,Colo. C10 1
Monessen,Pa. P16 1
Muncie,Ind. I-7 1
Palmer,Mass. W12 1
Roebling,N.J. R5 1
S.SanFrancisco C10 1
Waukegan,Ill. A7 1
Worcester,Mass.A7,T6 ..1

WIRE, Gal'd ACSR for Cor

Bartonville,Ill. K4 1
Buffalo W12 1
Johnstown,Pa. B2 1
Minnequa,Colo. C10 ..1
Monessen,Pa. P16 1
Muncie,Ind. I-7 1
Pittsburg,Calif. C11 ..1
Portsmouth,O. P12 1
Roebling,N.J. R5 1
SparrowsPt., Md. B2 ...1

ROPE WIRE

Bartonville,Ill. K4 1
Buffalo W12 1
Fostoria,O.(23) S1 1
Johnstown,Pa. B2 1
Monessen,Pa. P16 1
Muncie,Ind. I-7 1
Palmer,Mass. W12 1
Portsmouth,O. P12 1
Roebling,N.J. R5 1
SparrowsPt. B2 1
Struther,O. Y1 1
Worcester,Mass. J4 1
(A) Plow and Mild Plo
add 0.25c for Improved P

WIRE
(Continued)

RE, Tire Bead
rtonville, Ill. K4 ....14.15
nessen, Pa. P16 ....14.20
ebling,N.J. R5 ....14.35

RE, Cold-Rolled Flat
derson Ind. G6 .....9.00
ltimore T6 .....9.30
ffalo W12 .....9.00
veland A7 .....9.00
wfordsville,Ind. M8..9.00
ver.O. G6 .....9.00
storia,O. S1 .....9.00
nklinPark,Ill. T6 ....9.10
komo,Ind. C16 .....9.00
ssillon,O. R8 .....9.00
waukee C23 .....9.20
nessen,Pa. P16 .....9.00
wtucket,R.I. N8 ....9.30
rdale,Ill. A1 .....9.10
me,N.Y. R6 .....9.00
nton,N.J. R5 .....9.30
rcester A7, T6, W12..9.30

IL, Stock
o Dealers & Mfrs. (7) Col.
abamaCity,Ala. R2 ...152
quippa,Pa. J5 152
anta A11 154
rtonville,Ill. K4 154
cago,Ill. W13 152
veland A9 157
wfordsville,Ind. M8 ..154
nora,Pa. A7 152
luth, Minn. A7 152
rfield,Ala. T2 152
veston,Tex. D7 157
uston,Tex. S5 157
nstown,Pa. B2 152
let,Ill. A7 152
nsasCity,Mo. S5 157
komo,Ind. C16 154
nnequa,Colo. C10 157
nessen,Pa. P7 152
tsburg,Calif. C11 171
nkin,Pa. A7 152
hicago,Ill. R2 152
rrowsPt.,Md. B2 154
rling,Ill. (1) N15 152
rcester,Mass. A7 158

ILS, CUT (100 lb keg)
o Dealers (33)
shohocken,Pa. A3 ..$9.05
eeling,W.Va. W10 ..9.05

PLES, Polished Stock
o Dealers & Mfrs. (7) Col.
quippa,Pa. J5 152
anta A11 154
rtonville,Ill. K4 154
wfordsville,Ind. M8 ..154
nora,Pa. A7 152
luth,Minn. A7 152
rfield,Ala. T2 152
nstown,Pa. B2 152
let,Ill. A7 152
komo,Ind. C16 154
nnequa,Colo. C10 157
nessen,Pa. P7 152
tsburg,Calif. C11 171
nkin,Pa. A2 152
rrowsPt.,Md. B2 154
rling,Ill.(1) N15 152
rcester,Mass. A7 158

WIRE, Automatic Baler
½ Ga.) (Per 97 lb Net Box)
Coil No. 3150
abamaCity,Ala. R2 ..$9.35
rtonville,Ill. K4 .....9.45
ffalo W12 .....9.35
wfordsville,Ind. M8..9.46
nora,Pa. A7 .....9.35
luth,Minn. A7 .....9.35
nstown,Pa. B2 .....9.35
let,Ill. A7 .....9.35
komo,Ind. C16 .....9.45
Angeles B3 .....10.14
nnequa,Colo. C10 ....9.60
tsburg,Calif. C11 ....10.43
hicago,Ill. R2 .....9.35
rrowsPt.,Md. B2 .....9.45
rling,Ill. N15 .....9.35

Coil No. 6500 Stand.
abamaCity,Ala. R2 ..$9.65
rtonville,Ill. K4 .....9.75
ffalo W12 .....9.60
wfordsville,Ind. M8..9.75
nora,Pa. A7 .....9.65
luth,Minn. A7 .....9.65
nstown,Pa. B3 .....9.65
let,Ill. A7 .....9.65
komo,Ind. C16 .....9.75
sAngeles B3 .....10.45
nnequa,Colo. C10 ....9.90
tsburg,Calif. C11 ...10.13
hicago,Ill. R2 .....9.65
rrowsPt.,Md. B2 .....9.75
rling,Ill. N15 .....9.65

Coil No. 6500 Interim
abamaCity,Ala. R2 ..$9.70
rtonville,Ill. K4 .....9.80
ffalo W12 .....9.70

Crawfordsville,Ind. M8..9.80
Donora,Pa. A7 .....9.70
Duluth,Minn. A7 .....9.70
Johnstown,Pa. B2 .....9.70
Joliet,Ill. A7 .....9.70
Kokomo,Ind. C16 .....9.80
LosAngeles B3 .....10.50
Minnequa,Colo. C10 ...9.95
Pittsburg,Calif. C11 ..10.50
S.Chicago,Ill. R2 .....9.70
SparrowsPt.,Md. B2 ...9.80
Sterling,Ill. N15 .....9.70

WIRE, Barbed **Col.**
AlabamaCity,Ala. R2..175**
Aliquippa J5 .....172§
Atlanta A11 181
Bartonville,Ill. K4 181
Crawfordsville,Ind. M8..181
Donora,Pa. A7 .....175†
Duluth,Minn. A7 .....175†
Fairfield,Ala. T2 .....175†
Houston,Tex. S5 .....180†
Johnstown,Pa. B2 .....179*
Joliet,Ill. A7 .....175†
KansasCity,Mo. S5 ....180†
Kokomo,Ind. C16 .....177†
Minnequa,Colo. C10 ...180**
Monessen,Pa. P7 .....179*
Pittsburg,Calif. C11 ...195†
Rankin,Pa. A7 .....175†
S.Chicago,Ill. R2 .....175**
S.SanFrancisco C10 ...195**
SparrowsPoint,Md. B2 ..181*
Sterling,Ill.(1) N15 ....179*

WOVEN Fence, 9-15 Ga. Col.
Ala.City,Ala. R2 ....162**
Ala.City, 17 ga. R2 ...241**
Ala.City, 18 ga. R2 ...251**
Aliq'ppa,Pa.9-14½ga J5 165§
Atlanta A11 168
Bartonville,Ill K4 168
Crawfordsville,Ind. M8 ..168
Donora,Pa. A7 .....162†
Duluth,Minn. A7 .....162†
Fairfield,Ala T2 .....162†
Houston,Tex. S5 .....167†
Johnstown,Pa.(43) B2 ..166
Joliet,Ill. A7 .....162†
KansasCity, Mo. S5 ....167†
Kokomo,Ind. C16 .....164†
Minnequa,Colo. C10 ..167**
Monessen,Pa. 9 ga. P17.166*
Pittsburg,Calif. C11 ...185†
Rankin,Pa. A7 .....162†
S.Chicago,Ill. R2 ....162**
Sterling,Ill.(1) N15 ....166*

WIRE (16 Gage) Stone	An'ld	Galv.
Ala.City R2	14.50	16.05**
Bartonville K4	14.60	16.50
Buffalo W12	14.50	....
Cleveland A7	14.50	....
Crawf'dsville M8	14.60	16.50
Fostoria,O. S1	14.60	16.15†
Johnstown B2	14.15	16.40*
Kokomo C16	14.60	16.15†
Minnequa C10	14.75	16.45**
Palmer,Mass W12	14.50	16.05*
Pitts.,Calif. C11	14.85	16.40†
S.Chicago R2	14.50	16.05**
SparrowsPt. B2	14.60	16.50*
Sterling(1) N15	14.50	16.45††
Waukegan A7	14.50	16.05†
Worcester A7	14.80	....

WIRE, Merchant Quality
(6 to 8 gage) An'ld Galv.
Ala.City,Ala. R2.7.40 7.80**
Aliquippa J5 ....7.40 7.925§
Atlanta A11 .....7.50 8.075
Bartonville(48) K4 7.50 8.075
Buffalo W12 .....7.40 8.80†
Cleveland A7 ....7.40 ....
Crawfordsville M8 7.50 8.075
Donora,Pa. A7 ...7.40 7.80†
Duluth,Minn. A7..7.40 7.80†
Fairfield T2 ....7.40 7.80†
Houston,Tex. S5 ..7.65 8.05†
Jacks'ville.Fla.M8 7.90 8.475
Johnstown B2(48) 7.40 7.975*
Joliet,Ill. A7 ....7.40 7.80†
KansasCity,Mo. S5 7.65 8.05†
Kokomo C16 ....7.50 7.90†
LosAngeles B3 ..8.35 8.925*
Minnequa C10 ...7.65 8.05**
Monessen P7 (48) 7.40 7.975*
Palmer,Mass. W12 7.70 8.10†
Pitts.,Calif. C11 ..8.35 8.75†
Portsmouth,O. P12 7.40 ....
Rankin A7 .....7.40 7.80†
S.Chicago R2 ...7.40 7.80**
S.SanFran. C10 .8.35 8.75**
Spar'wsPt.B2(48) 7.50 8.075*
Str'ling(1)(48)N15 7.40 8.00††
Struthers,O.(48)Y1 7.40 7.90‡
Worcester,Mass.A7 7.70 ....

*Based on 12.50c zinc; †5c zinc; §10c zinc; ‡Less than 10c zinc; **Subject to zinc equalization extras. ††13c zinc.

BALE TIES, Single Loop **Col.**
AlabamaCity,Ala. R2 ...173
Atlanta A11 175
Bartonville,Ill. K4 175
Crawfordsville,Ind. M8 ..175
Donora,Pa. A7 173
Duluth,Minn. A7 173
Fairfield,Ala. T2 173
Joliet,Ill. A7 173
Houston S5 178
KansasCity,Mo. S5 178
Kokomo,Ind. C16 175
Minnequa,Colo. C10 178
S.Chicago R2 173
S.SanFran.,Calif. C10 ..197
SparrowsPoint,Md. B2 ..175
Sterling,Ill.(1) N15 173

FENCE POSTS

	Col
ChicagoHts.,Ill. C2, I-2..	157
Duluth,Minn. A7	157
Franklin,Pa. F5	157
Huntington,W.Va. W7 ..	157
Johnstown,Pa. B2	160
Marion,O. P11	157
Minnequa,Colo. C10	162
Moline Ill R2	162
S.Chicago,Ill. R2	157
Tonawanda,N.Y. B12 ..	157
Williamsport Pa S10	160

FASTENERS

(Base discounts, full case quantity, per cent off list to consumer, f.o.b. mill)

Carriage, Machine Bolts
Full-Size Body (cut thread)
†½" x 6" and smaller 61
Larger than ½" diam. and all diams. longer than 6" 55
Under-Size Body (rolled thread; not nutted):
½" x 6" and smaller. 61
Carriage, Machine & Lag Bolts, Hot Galvanized:
½" and smaller 42
Larger than ½" diam. and all diams. longer than 6" 32

†½" x 4" and smaller and shorter are not nutted.

Lag Bolts
All diams. x 6" and shorter 61
All diams. longer than 6" 55
Plow, Tap & Blank Bolts
½" x 6" and smaller. 61
Larger than ½" diam. and all diams. longer than 6" 55
Ribbed Neck, Carriage, Step, Elevator, Fitting-Up and Tire Bolts:
All sizes 61
STOVE BOLTS, SLOTTED (nuts not attached; bulk)
⅛" to ¼" diam. incl., 3" or shorter:
25,000 to 199,999 pieces 61
200,000 or more pieces 64
5/16" to ½" diam. incl., 3" or shorter:
15,000 to 99,999 pieces 61
100,000 or more pieces 64
Longer than 3", any diam.: 5000 to 99,999 pieces. 61
100,000 or more pieces 64

RIVETS

F.o.b. Cleveland, and/or freight equalized with Pittsburgh, f.o.b. Chicago, and/or freight equalized with Birmingham except where equalization is too great.
Structural ½-in., larger 9.95
7/8-in. under..List less 32%

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill: minimum wall thickness, cut lengths 10 to 24 ft. inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	21.06	20.42
1¼	13	....	24.94	20.45
1½	13	23.31	27.57	22.61
1¾	13	27.54	32.57	26.71
2	13	30.87	36 51	29.93
2¼	13	34.77	41.12	33.72
2½	12	37 73	44.63	36.60
2⅞	12	41.57	49.16	40 31
3¼	12	45 00	53.22	43.65
3	12	47.99	56.76	46.55

RAILWAY MATERIALS

	Standard No. 1	Standard No. 2	Tee Rails All	Tee Rails 60 lb Under
RAILS				
Bessemer,Pa. U5	4.725	4.625	4.675	5.65
Ensley,Ala. T2	4.725	4.625	....	5.65
Fairfield,Ala. T2	....	....	....	5.65
Gary,Ind. U5	4.725	....	....	....
Huntington,W.Va. W7	....	....	....	5.65
IndianaHarbor,Ind. I-2	4.725	4.625	4.675	....
Johnstown,Pa. B2	....	....	...(16)	5.65
Lackawanna,N.Y. B2	4.725	4.625	....	5.65
Minnequa,Colo C10	4.725	4.625	....	6.15
Steelton,Pa. B2	4.725	4.625	....	....
Williamsport,Pa. S19	....	....	....	5.65

TIE PLATES
Fairfield,Ala. T2 .....5.625
Gary,Ind. U5 .....5.625
Ind.Harbor,Ind. I-2 ...5.625
Lackawanna,N.Y. B2 ..5.625
Minnequa,Colo. C10 ...5.625
Seattle B3 .....5.775
Steelton,Pa. B2 .....5.625
Torrance,Calif. C11 ...5.775

TRACK BOLTS (20) Treated
Cleveland R2 .....12.40
KansasCity,Mo. S5 ....12.40
Lebanon,Pa. B2 .....12.40
Minnequa,Colo. C10 ...12.40
Pittsburgh O3, P14 ....12.40
Seattle B3 .....12.90

AXLES
Ind.Harbor,Ind. S13 ....7.25
Johnstown,Pa. B2 .....7.25

JOINT BARS
Bessemer,Pa. U5 .....5.825
Fairfield,Ala. T2 .....5.825
Ind.Harbor,Ind. I-2 ...5.825
Joliet,Ill. U5 .....5.825
Lackawanna,N.Y. B2 ..5.825
Minnequa,Colo. C10 ...5.825
Steelton,Pa. B2 .....5.825

SCREW SPIKES
Cleveland R2 .....11.90
Pittsburgh O3 .....11.90

STANDARD TRACK SPIKES
Fairfield,Ala. T2 .....7.90
Ind.Harbor,Ind. I-2, Y1.7.90
KansasCity,Mo. S5 ....7.90
Lebanon,Pa. B2 .....7.90
Minnequa,Colo. C10 ....7.90
Pittsburgh J5 .....7.90
Seattle B3 .....8.40
S.Chicago,Ill. R2 .....7.90
Struthers,O. Y1 .....7.90
Youngstown R2 .....7.90

METAL POWDER

(Per pound f.o.b shipping point in ton lots for minus 100 mesh, except as otherwise noted)

	Cents
Sponge iron: 98+% Fe, annealed.	9.25
Unannealed: Minus 100 mesh	11.75
Minus 35 mesh	8.25
Minus 20 mesh	9.00
Swedish, c.l.f. Camden, N. J., c.l. in bags.	9.50
Domestic (Swedish), f.o.b. Riverton, N.J., in bags	9.50
Canadian, f.o.b. Shipping point	8.50
Electrolytic iron: Melting stock, 99.9% Fe, irregular fragments of ⅛ in. x 1.3 in.	22.00
Annealed, 99.5% Fe.	36.50
Unannealed (99+% Fe)	34.00
Unannealed (99+% Fe) (minus 325 mesh)	57.00
Powder Flakes (minus 16, plus 100 mesh)..	31.00
Carbonyl Iron: 97.9-99.8% size 5 to 10 microns..83.00-148.00	
Aluminum: Atomized, 500 lb. drum frght. allowed Carlots	34.50
Ton lots	36.50
Antimony, 500 lb lots	32.00*
Brass, 5000-lb lots	38.00-50.00†
Bronze, 5000-lb lots	61.25-64.50†
Copper: Electrolytic	56.75
Reduced	56.75
Lead	22.80
Manganese: Minus 35 mesh	64.00
Minus 100 mesh	70.00
Minus 200 mesh	75.00
Nickel, unannealed ..	$1.60
Nickel-Silver, 5000-lb lots	58.75-61.50†
Phosphor-Bronze, ¼-ton lots	58.50
Silicon	47.50
Solder	7.00*
Stainless Steel, 302 ..	99.00
Stainless Steel, 316 ..	$1.32
Tin	14.50*
Zinc, 5000-lb lots	18.75-32.50‡
Tungsten Melting grade, 99% 60 to 200 mesh:	Dollars
1000 lb and over...	4.50
Less than 1000 lb..	4.65
Chromium, electrolytic 99.2% Cr min.	3.50

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §70% Cu, 20% Zn, 10% Ni, **64% Cu, 18% Zn, 18% Ni.

Footnotes

(1) Chicago Base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 Ga. and heavier.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) 3/8" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) 0.25 off for untreated.
(21) New Haven, Conn., base.
(22) Deld. San Francisco Bay area.
(23) Mild plow, 10.55c.
(24) Deduct 0.10c, finer than 15 Ga.
(25) Bar mill bands.
(26) Delivered in mill zone, 5.25c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill and 0.45c for carbon, add 0.40c for alloy and 0.45c H.S.-L.A.
(31) Widths over 5/8-in.; 6.90c for widths 5/8-in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 13 Ga. & heavier; 60" & narrower.
(38) 14 Ga. & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.25c.
(43) 9-14½ Ga.
(48) 6-7 Ga.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	G
Aliquippa, Pa. J5	6.5	+10	10.5	+7.25	13	+4.75	14.5	+3.25	14.5	+3.25	14	+3.75	16.5	+
Ambridge, Pa. N2	6.5	..	10.5	...	13	...	14.5	...	14.5	...	14	...	16.5	
Lorain, O. N3	6.5	+10	10.5	+7.25	13	+4.75	14.5	+3.25	14.5	+3.25	14	+3.75	16.5	+
Youngstown Y1	6.5	+10	10.5	+7.25	13	+4.75	14.5	+3.25	14.5	+3.25	14	+3.75	16.5	+

ELECTRIC WELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	6.5	+10	10.5	+7.25	13	+4.75	14.5	+3.25	14.5	+3.25	14	+3.75	16.5	+

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	G
Aliquippa, Pa. J5	...	...	....	....	....	....	17.5	0.25	20.5	4.25	23	7.75	25.5	
Alton, Ill. L1	...	...	....	....	....	....	15.5	+1.75	18.5	2.25	21	5.75	23.5	
Benwood, W. Va. W10..	16.5	+12	7.25	+18.25	+1.75	+26.25	17.5	0.25	20.5	4.75	23	7.75	25.5	
Butler, Pa. F6	17.5	+11	9	+16.5	0.5	+24	...	...	...	...	...	...	...	
Etna, Pa. N2	...	...	....	....	....	....	17.5	0.25	20.5	4.25	23	7.75	25.5	
Fairless Hills, Pa. N3	...	...	....	....	....	....	15.5	+1.75	18.5	2.75	21	5.75	23.5	
Fontana, Calif. K1	...	...	....	....	....	....	6	+11.25	9	+7.25	11.5	+3.75	14	+
Ind. Harbor, Ind. Y1	...	...	....	....	....	....	16.5	+0.75	19.5	3.25	22	6.75	24.5	
Lorain, O. N3	...	...	....	....	....	....	17.5	0.25	20.5	4.25	23	7.75	25.5	
Sharon, Pa. S4	17.5	+11	9	+16.5	0.5	+24	...	...	...	...	...	...	...	
Sharon, Pa. M6	...	...	....	....	....	....	17.5	0.25	20.5	4.25	23	7.75	25.5	
Sparrows Pt., Md. B2...	15.5	+13	7	+18.5	+1.5	+26	15.5	+1.75	18.5	2.25	21	5.75	23.5	
Youngstown R2, Y1	...	...	....	....	....	....	17.5	0.25	20.5	4.25	23	7.75	25.5	
Wheatland, Pa. W9	17.5	+11	9	+16.5	0.5	+24	17.5	0.25	20.5	4.25	23	7.75	25.5	

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.73		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	G
Aliquippa, Pa. J5	26	10	26.5	10.5	28	10.75	28	10.75	....	...	....	
Alton, Ill. L1	24	8	24.5	8.5	26	8.75	26	8.75	....	...	....	
Benwood, W. Va. W10...	26	10	26.5	10.5	28	10.75	28	10.75	18.5	0.75	18.5	
Etna, Pa. N2	26	10	26.5	10.5	28	10.75	28	10.75	18.5	0.75	18.5	
Fairless Hills, Pa. N3....	24	8	24.5	8.5	26	8.75	26	8.75	16.5	+1.25	16.5	+
Fontana, Calif. K1	14.5	+1.5	15	+1	16.5	+0.75	16.5	+0.75	7	+10.75	7	+1
Ind. Harbor, Ind. Y1	25	9	25.5	9.5	27	9.75	27	9.75	17.5	+0.25	17.5	+
Lorain, O. N3	26	10	26.5	10.5	28	10.75	28	10.75	....	...	....	
Sharon, Pa. M6	26	10	26.5	10.5	28	10.75	28	10.75	....	...	....	
Sparrows Pt., Md. B2....	24	8	24.5	8.5	26	8.75	26	8.75	16.5	+1.25	16.5	+
Youngstown R2, Y1	26	10	26.5	10.5	28	10.75	28	10.75	18.5	0.75	18.5	
Wheatland, Pa. W9	26	10	26.5	10.5	28	10.75	28	10.75	18.5	0.75	18.5	

*Galvanized pipe discounts based on current price of zinc (13.00c, East St. Louis).

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	Rerolling Ingots	Rerolling Slabs, Billets	Forging Billets	Seamless Tube Billets	H.R. Strip	Shapes; H.R. & C.F. Bars; Wire	Plates	Sheets	C.R. Strip; Flat Wire
201	17.00	21.50	....	....	31.00	....	....	42.25	39.00
202	18.25	24.00	31.00	36.25	33.50	36.75	38.75	42.50	42.50
301	17.75	22.25	....	36.75	32.00	38.00	....	44.25	41.00
302	19.00	24.75	32.00	37.25	34.50	38.25	40.25	44.50	44.50
302B	20.25	26.50	33.00	37.25	37.75	38.25	40.25	47.00	47.00
303	....	26.75	34.75	40.00	....	41.00	....	....	....
304	20.25	26.00	33.75	39.00	37.25	40.25	43.00	47.25	47.25
304L	....	....	38.75	44.00	42.25	45.25	48.00	52.25	52.25
305	21.75	28.25	....	39.50	40.25	40.25	43.50	50.25	50.25
308	22.00	29.00	38.50	44.25	41.25	45.50	49.75	52.00	52.00
309	29.50	38.25	46.75	53.50	53.50	54.75	58.25	67.00	67.00
309S	31.50	41.00	51.00	59.00	58.50	60.25	63.75	74.00	74.00
310	37.25	48.00	62.25	72.25	68.50	73.50	75.25	78.75	78.75
314	....	....	....	....	....	....	75.25	....	....
316	31.50	40.25	51.25	59.50	58.25	60.75	64.00	68.25	68.25
316L	....	....	56.25	64.75	63.25	65.75	69.25	73.25	73.25
317	37.25	48.25	62.75	72.75	73.50	74.50	77.00	83.75	83.75
321	25.00	32.00	38.25	44.00	44.25	45.25	49.25	54.25	54.25
18-8CbTa	29.25	38.00	45.75	52.25	53.25	53.50	58.00	66.50	66.50
403	....	....	28.75	32.75	....	34.00	36.25	....	44.00
405	17.50	23.00	26.75	31.00	32.25	32.00	33.75	42.25	42.25
410	15.00	19.50	25.50	29.50	28.00	30.50	31.75	36.25	36.25
416	....	....	....	26.00	30.00	....	31.00	....	....	....
420	23.50	30.25	31.00	36.00	37.75	37.25	40.75	56.00	56.00
430	15.25	19.75	26.00	30.00	28.75	31.00	32.25	36.75	36.75
430F	....	....	26.50	30.50	....	31.50	....	....	....
431	16.00	20.50	26.50	30.50	29.75	31.50	33.00	38.00	38.00
446	....	....	35.50	40.50	53.25	42.00	43.25	63.25	63.25

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; Alloy Metal Wire Co. Inc.; Alloy Tube Div., Carpenter Steel Co.; American Steel & Wire Div., U S. Steel Corp.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; G. O. Carlson Inc.; Carpenter Steel Co.; Charter Wire Products Co.; Cold Metal Products Co.; Crucible Steel Co. of America; Damascus Tube Co.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Ellwood Ivins Steel Tube Works Inc.; Firth Sterling Inc.; Ft. Wayne Metals Inc.; Globe Steel Tubes Co.; Helical Tube Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Joslyn Mfg. & Supply Co.; Kenmore Metals Corp.; Maryland Fine & Specialty Wire Co.; McLouth Steel Corp.; Metal Forming Corp.; McInnes Steel Co.; National-Standard Co.; National Tube Div., U. S. Steel Corp.; Newman-Crosby Steel Co.; Pacific Tube Co.; Page Steel & Tube Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Rodney Metals Inc.; Rome Mfg. Co.; Rotary Electric Steel Co.; Sharon Steel Corp.; Sawhill Tubular Products Inc.; Simonds Saw & Steel Co., Specialty Wire Co. Inc.; Spencer Wire Corp.; Stainless Welded Products Inc.; Standard Tube Co.; Superior Steel Corp.; Superior Tube Co.; Timken Roller Bearing Co.; Trent Tube Co.; Tube Methods Inc.; Ulbrich Stainless Steels; United States Steel Corp.; Universal-Cyclops Steel Co.; Wallingford Steel Co.; Washington Steel Corp.

Clad Steel

	Plates: Carbon Base 10%	Plates: Carbon Base 20%	Sheet: Carbon 20
Stainless:			
302	....	....	30.
304	30.30	36.05	32.
304-L	32.30	37.95	..
310	41.30	47.00	..
316	35.50	41.40	47.
316-L	40.00	46.10	..
316-CB	41.15	48.45	..
321	32.00	37.75	37.
347	34.40	41.40	48.
405	25.80	33.35	..
410	25.30	32.85	..
430	25.30	32.85	..
Inconel	49.45	65.45	..
Nickel	41.05	55.65	..
Nickel, Low Carbon	43.25	60.05	..
Monel	42.35	56.35	..
Copper*	....	....	46.

	Strip, Carbon Base, Cold Rolled: 10%	Strip, Carbon Base, Cold Rolled: Both
Copper*	30.00	38.

*Deoxidized. Production points: Stainless-clad sh New Castle, Ind. I-4; stainless-clad plates, Claymont, C22, Coatesville, Pa. L7, New Castle, Ind. I-4 and W ington, Pa. J3; nickel, inconel, monel-clad plates, Co ville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ p
Regular Carbon	0.275	5%Cr Hot Work	0.430-(
Extra Carbon	0.330	W-Cr Hot Work	.... (
Special Carbon	0.390	V-Cr Hot Work	.... (
Oil Hardening	0.430	Hi-Carbon-Cr	..... (

Grade by Analysis (%) W	Cr	V	Co	Mo	$ p
20.25	4.25	1.6	12.25	...	.....
18.25	4.25	1	4.75	...	..... 2.305-2
18	4	2	9	...	..... 2.675-2.
18	4	2	....	...	.....
18	4	1	....	...	.....
13.75	3.75	2	5	...	.....
13.5	4	3	....	...	.....
9	3.5	..	....	...	.....
6	4	2	....	5	.....
6	4	3	....	6	.....
1.5	4	1	....	8.5	..... (

Tool steel producers include: A4, A8, B2, B8, C4, C13, C18, D4, F2, J3, M14, S8, U4, V2 and V3.

g Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax.

ingham District	Basic	No. 2 Foundry	Malle-able	Besse-mer
amaCity,Ala. R2	54.50	55.00‡	....	....
ningham R2	54.50	55.00‡	....	....
ningham U6	....	55.00‡	59.00	....
dward,Ala. W15	54.50	55.00‡	59.00	....
ncinnati, deld.	....	62.70	....	....
falo District				
falo H1, R2	58.50	59.00	59.50	60.00
awanda,N.Y. W12	58.50	59.00	59.50	60.00
nawanda,N.Y. T9	....	59.00	59.50	60.00
ston, deld.	69.15	69.65	70.15	....
chester,N.Y. deld.	61.52	62.02	62.52	....
racuse,N.Y. deld.	62.62	63.12	63.62	....
ago District				
ago I-3	58.50	59.00	59.00	59.50
,Ind. U5	58.50	....	59.00	....
icago R2	58.50	....	59.00	....
icago,Ill. Y1	58.50	59.00	59.00	59.50
icago,Ill. U5, W14	58.50	....	59.00	59.50
ilwaukee, deld.	60.67	61.17	61.17	61.67
uskegon,Mich. deld.	....	65.30	65.30	....
eland District				
eland A7, R2	58.50	59.00	59.00	59.50
kron,O., deld.	61.25	61.75	61.75	62.25
in,O. N3	58.50	....	....	59.50
-Atlantic District				
lehem,Pa. B2	60.50	61.00	61.50	62.00
ewYork, deld.	....	64.78	65.28	....
ewark, deld.	63.52	64.02	64.52	65.02
sboro,Pa. B10	60.50	61.00	61.50	62.00
ster,Pa. P14	60.50	61.00	61.50	....
iladelphia, deld.	62.16	62.66	63.16	....
lton,Pa. B2	60.50	61.00	61.50	62.00
deland,Pa. A3	60.50	61.00	61.50	62.00
iladelphia, deld.	62.16	62.66	63.16	63.66
,N.Y. R2	60.50	61.00	61.50	62.00
sburgh District				
lleIsland,Pa. P6	58.50	59.00	59.00	....
ttsburgh (N&S sides), Aliquippa, deld.	....	60.37	60.37	60.87
cKeesRocks, deld.	....	60.04	60.04	60.54
awrenceville,Homestead, Wilmerding, Monaca, deld.	....	60.66	60.66	61.16
erona,Trafford, deld.	60.69	61.19	61.19	61.69
ackenridge, deld.	60.95	61.45	61.45	61.95
emer,Pa. U5	58.50	....	59.00	59.50
rton,Rankin,S.Duquesne,Pa. U5	58.50	....	....	....
eesport,Pa. N3	58.50	....	....	59.50
land,Pa. C18	58.50	....	....	....

Youngstown District	Basic	No. 2 Foundry	Malle-able	Besse-mer
Hubbard,O. Y1	....	....	59.00	....
Sharpsville,Pa. S6	58.50	....	59.00	59.50
Youngstown Y1	....	....	59.00	59.50
Youngstown U5	58.50	....	....	59.50
Mansfield,O., deld.	63.40	....	63.90	64.40
Duluth I-3	58.50	59.00	59.00	59.50
Erie,Pa. I-3	58.50	59.00	59.00	59.50
Everett,Mass. E1	62.00	62.50	63.00	....
Fontana,Calif. K1	64.50	65.00	....	....
Geneva,Utah C11	58.50	59.00	....	....
GraniteCity,Ill. G4	60.40	60.90	61.40	....
Ironton,Utah C11	58.50	59.00	....	....
LoneStar,Texas L6	....	55.00*	....	....
Minnequa,Colo. C10	60.50	61.00	61.50	....
Rockwood,Tenn. T3	....	55.00‡	59.00	....
Toledo,O. I-3	58.50	59.00	59.00	59.50
Cincinnati, deld.	64.26	64.76	....	....

*Phos. 0.51-0.75%; $56, Phos. 0.31-0.50%.
‡Intermediate (Phos. 0.31-0.69%), $56.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.
Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.
Nickel: Under 0.05% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1 for each 0.5% Si; 75 cents for each 0.50% Mn over 1%)

Jackson,O. G2, J1	$67.50
Buffalo H1	68.75

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

NiagaraFalls,N.Y. P15	$85.50
Keokuk,Iowa, (Open-hearth & Fdry, freight allowed K2)	90.00
Keokuk, O.H. & Fdry, 12½ lb piglets, 16% Si, frgt allowed K2	93.00

LOW PHOSPHORUS PIG IRON, Gross Ton

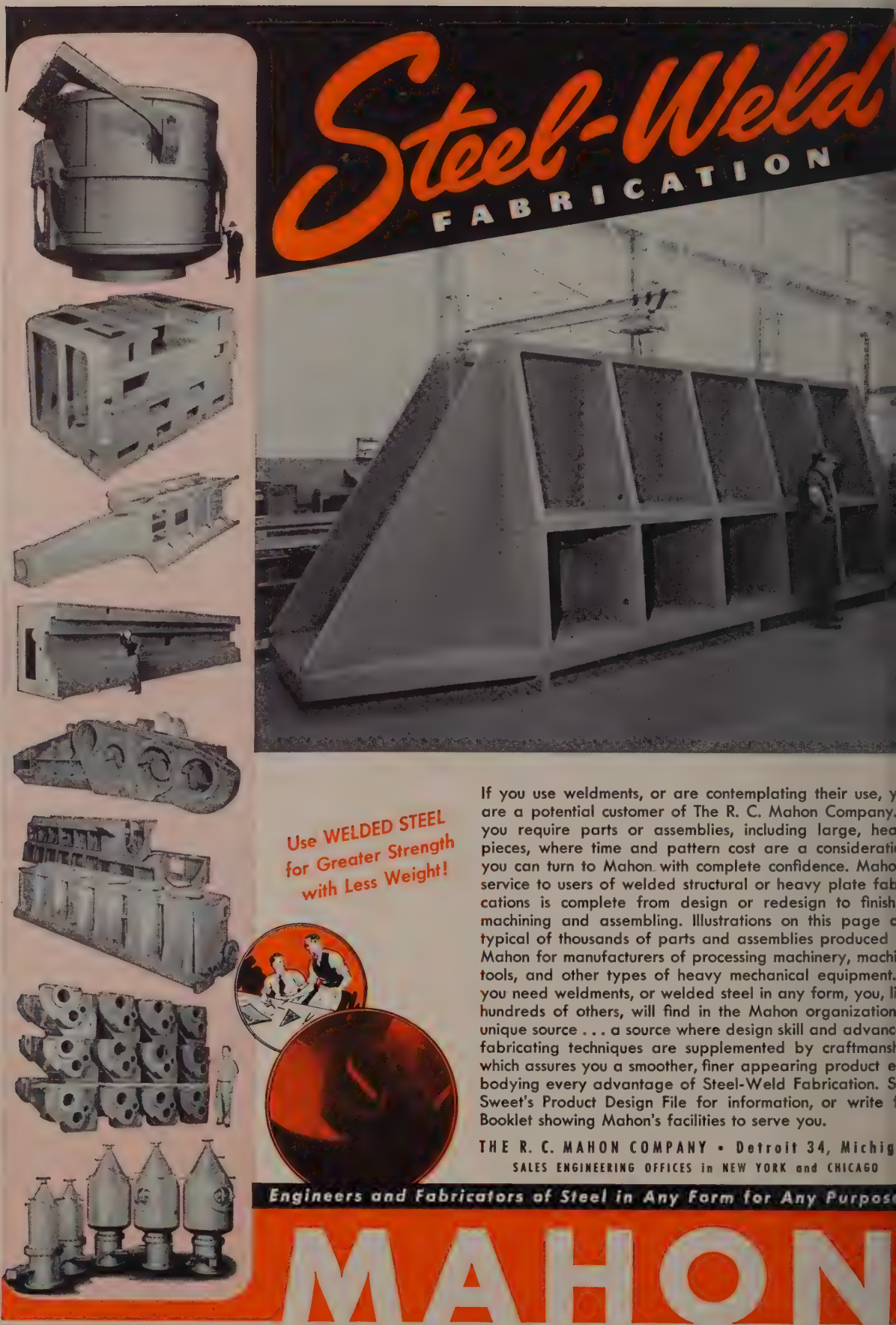
Lyles,Tenn. T3 (Phos. 0.035% max)	$72.50
Steelton,Pa. B2 (Phos. 0.035% max)	66.50
Philadelphia, deld.	70.05
Troy,N.Y. R2 (Phos. 0.035% max)	66.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	63.50
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	63.50
Erie,Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	63.50

Warehouse Steel Products

Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 25 cents per 100 lb except: Buffalo, Cleveland, Erie, 30 cents; Moline, Norfolk, Richmond, Washington, 20 cents; Birmingham, Chattanooga, Jackson, 15 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, San Francisco, 10 cents; Atlanta, Houston, Seattle, Spokane, no charge.

	SHEETS				STRIP		BARS			Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Gal. 10 Ga.†	Stainless Type 302	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.‡	H.R. Alloy 4140††[5]		Carbon	Floor
nta	7.14	8.20	8.87	....	7.40	...	7.42	9.39	....	7.63	7.49	9.48
imore	7.03	8.32	8.37	....	7.65	...	7.61	8.62[3]	13.44	7.93	7.21	8.87
ningham	6.80	7.90	8.85	....	7.06	...	7.08	9.35	....	7.28	6.99	9.10
ton	7.70	8.81	10.27	45.67	7.96	...	7.83	9.53	14.45	8.13	7.89	9.36
falo	6.80	8.05	9.77	....	7.15	...	7.10	7.90	13.10	7.40	7.15	8.70
ttanooga	6.95	8.10	8.60	....	7.20	...	7.20	9.18	....	7.45	7.25	9.05
ago	6.80	8.09	8.50	49.05	7.06	...	7.08	7.75	12.85	7.28	6.99	8.46
innati	6.92	8.08	8.90	46.10	7.30	...	7.32	8.05	13.09	7.75	7.28	8.71
eland	6.80	8.09	8.85	49.16	7.16	...	7.14	7.85	12.91	7.61	7.16	8.63
roit	6.99	8.28	8.78	43.50	7.34	...	7.36	8.04	13.05	7.75	7.27	8.65
, Pa.	6.80	7.90	8.85	....	7.15	...	7.08	7.85	....	7.40	7.15	8.63
ston	7.85	8.75	10.49	....	8.15	...	8.25	9.85	14.00	8.20	7.80	9.20
son, Miss.	7.10	8.20	9.20	....	7.40	...	7.40	9.44	....	7.60	7.45	9.30
Angeles	8.05	10.00	11.00	....	8.35	...	8.05	11.25	14.25	8.30	8.05	10.25
vaukee	6.89	8.18	8.59	....	7.15	...	7.17	7.94	12.94	7.45	7.08	8.55
ne, Ill.	7.15	8.44	8.85	....	7.41	...	7.43	8.10	....	7.63	7.34	...
York	7.46	8.68	9.44	44.95	8.07	...	7.96	9.48	13.28	7.99	7.76	9.19
folk, Va.	7.25	...	...	....	7.65	...	7.65	9.50	....	7.95	7.45	8.95
adelphia	7.14	8.42	9.35	45.98	7.67	9.02	7.64	8.46	13.16	7.74	7.37	8.69**
sburgh	6.80	8.09	9.20	49.00	7.16	...	7.08	7.85	12.85	7.28	6.99	8.46
land, Oreg.	7.80	8.80	10.65	....	8.00	...	7.95	12.20	15.00	7.85	7.75	9.60
mond, Va.	7.00	...	9.47	....	7.65	...	7.70	8.85	....	7.95	7.20	9.10
Louis	7.09	8.38	9.19	43.89	7.35	...	7.37	8.14	13.14	7 68	7.28	8.75
Paul	7.46	8.59	9.16	....	7.72	...	7.74	8.51	13.51	7.94	7.65	9.12
Francisco	8.10	9.65	10.15	51.65	8.35	...	8.05	11.20	14.25[3]	8.25	8.05	10.25
tle	8.55	10.40	10.80	54.00	8.65	...	8.35	11.70	14.60	8.30	8.20	10.10
kane	8.55	11.00[7]	10.80	....	9.05	...	8.35	11.80	15.35	8.30	8.20	10.60
shington	7.50	8.79	7.97	....	8.12	...	8.08	9.09	....	8.40	7.68	9.34

Prices do not include gage extras; †prices include gage and coating extras (based on 12.50-cent zinc), except in Birmingham (coating extra excluded); ‡includes 35-cent special bar quality extras; **⅜-in. and heavier; ††as annealed; §§under ½-in.
Base quantities, 2000 to 4999 lb except as noted; Cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb, and Los Angeles, 6000 lb and over; stainless sheets, 8000 lb except in Chicago, New York and Boston, 10 000 lb, and in San Francisco, 2000 to 4999 lb; -rolled products on West Coast, 2000 to 9999 lb; [2]—500 to 9999 lb; [3]—100 to 999 lb; [4]—4000 lb and over; [5]—1000 to 1999 lb; [6]—1000 lb and over; 1500 to 3999 lb; [8]—2000 to 3999 lb; [9]—f.o.b. local delivery in lots of 10,000 lb and over.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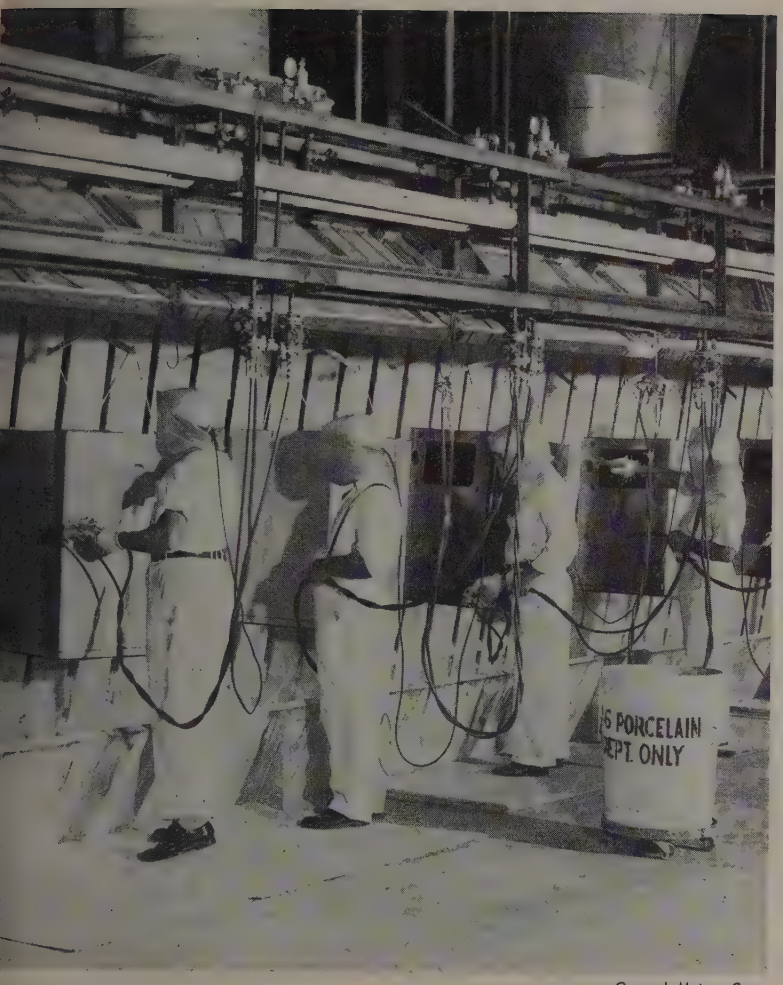


General Motors Corp.

eavy demand for porcelain enameled products causes . . .

nameling Iron To Expand

ODUCERS of enameling iron are pressing confidence in construction l appliances, their chief markets, increasing their capacities.

J. S. Steel Corp., Pittsburgh, will ld a complete new line for the duction of its vitrenamel sheets its Irvin Works, Dravosburg, Pa. s will result in "considerable ex- sion in production by late 1956," npany officials state. Inland Steel , Chicago, also has announced ns for a continuous normalizing which will double its production enameling sheets by the end of 8. Armco Steel Corp., Middle- n, O., says it has had an im- tant increase in both cold and -rolled capacity for this product the past year, and its over-all expansion program calls for even more.

What It Means—This expansion is going on despite several developments which could result in an easing in the market for this specialty product. In the last few years, there has been a trend toward synthetic enamels, which can be applied to regular grades of carbon steel. However, industry officials believe the trend is reversing and that vitreous enamels are once again recognized as the best coating. This assures them of a stable market, they feel.

The future market may be influenced by the development of low-temperature frits, which will permit the use of regular grades of carbon sheet. At present, enameling requires a temperature of about 1550° F, at which level ordinary steel will begin to sag. With the new frits, temperature can be reduced to about 1250° F, which regular carbon steel sheet can withstand.

Producers feel that this development is still far enough away from perfection to warrant their expansion of enameling sheet to meet the demands of the present and near-future market. In addition, they believe that the proper bonding between the metal and the coating can be obtained only with the special analysis of enameling iron.

Morale Booster—Producers have gained this confidence in their markets over the last few years largely because of the construction boom. Long used to decorate the exteriors of gas stations and drug stores, porcelain enamel has graduated to the multistory building as a curtain wall material. Because of the tonnage involved in even a small building, this segment of the market is pushing appliances as the No. 1 consumer.

But appliances are not to be counted out. They have been the bread-and-butter market for enameling sheet for years and will continue to be one of the most important users for a long time. Such heavy users as refrigerators, home freezers, ranges, washing machines and automatic dryers are enjoying a peak year.

Another significant segment of the market—formed metal plumbing ware—is also more than holding its own. As long as high-level residential construction continues, enameling iron producers see a steady market for heavier sheets.

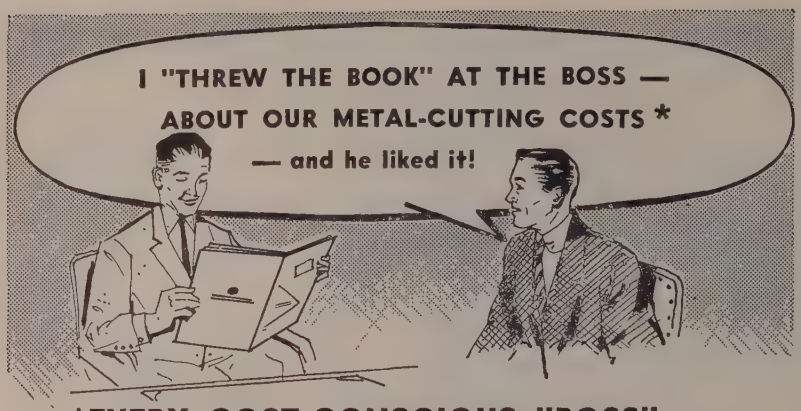
Sheets, Strip . . .

Sheet & Strip Prices, Pages 133 & 134

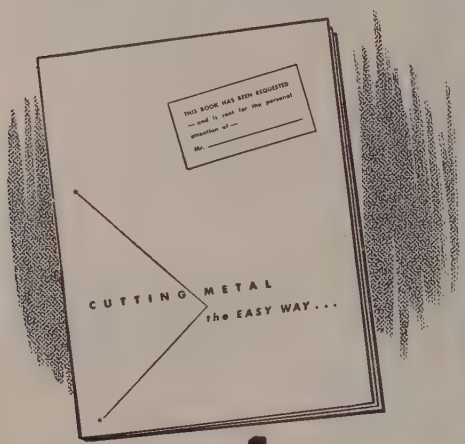
Most sheet steel sellers are sold out for the first quarter. Exceptions are where there has been delay in booking orders for certain products because of mill efforts to get commitments in better balance with shipments by year end.

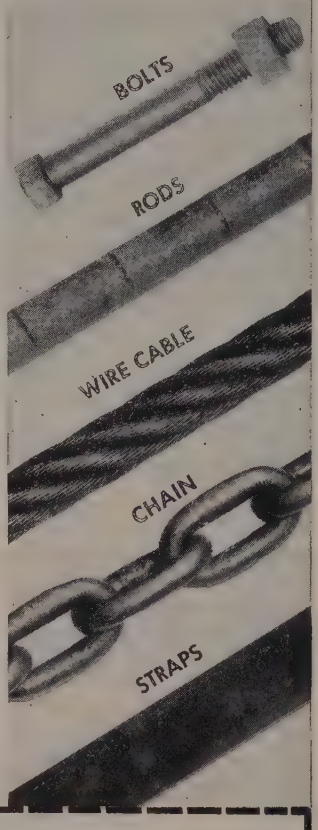
Some producers are encouraging customers to send in inquiries on bare needs for the second quarter, so as to guide them in setting up schedules for that period. Here, mills are following previous policy. In general, sheetmakers are being offered far more tonnage than they can handle promptly.

Except for galvanized sheets, which are experiencing a seasonal lull, all sheet categories are under increasing pressure at Chicago. Demand is paced by that from the automobile



*EVERY COST-CONSCIOUS "BOSS" WILL LIKE THIS BOOK — if his company cuts any of these materials! —





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industry, which is pursuing terrif scheduling during November and D cember.

Hot-rolled sheets, particularly th wider sizes, are in tighter supp than cold rolled, evidence that the is strong demand in the market ot er than that arising on automoti account.

In New England, of all the fla rolled products, only narrow col rolled carbon strip is in near supply demand balance. The temporar withdrawal of several mills from th market on hot-rolled sheets in th Northeast is shifting the first qua ter tonnage load.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 132

Bridge and highway requiremen are mounting in New England, be ing bolstered substantially by Con necticut turnpike needs. Sixty-eigh miles of the 128-mile highway wi be of reinforced concrete.

Contracts already estimated ca for 2250 tons of mat reinforcing an about 25,000 tons of mesh. Genera contracts closed to date take 13,50 tons of reinforcing bars for bridg and drainage structures.

Reinforcing bar prices are stronge in New England.

The proposed Priest Rapids powe project on the Columbia river will re quire 23,000 tons of reinforcing bar Bids will be taken in January.

Structural Shapes . .

Structural Shape Prices, Page 132

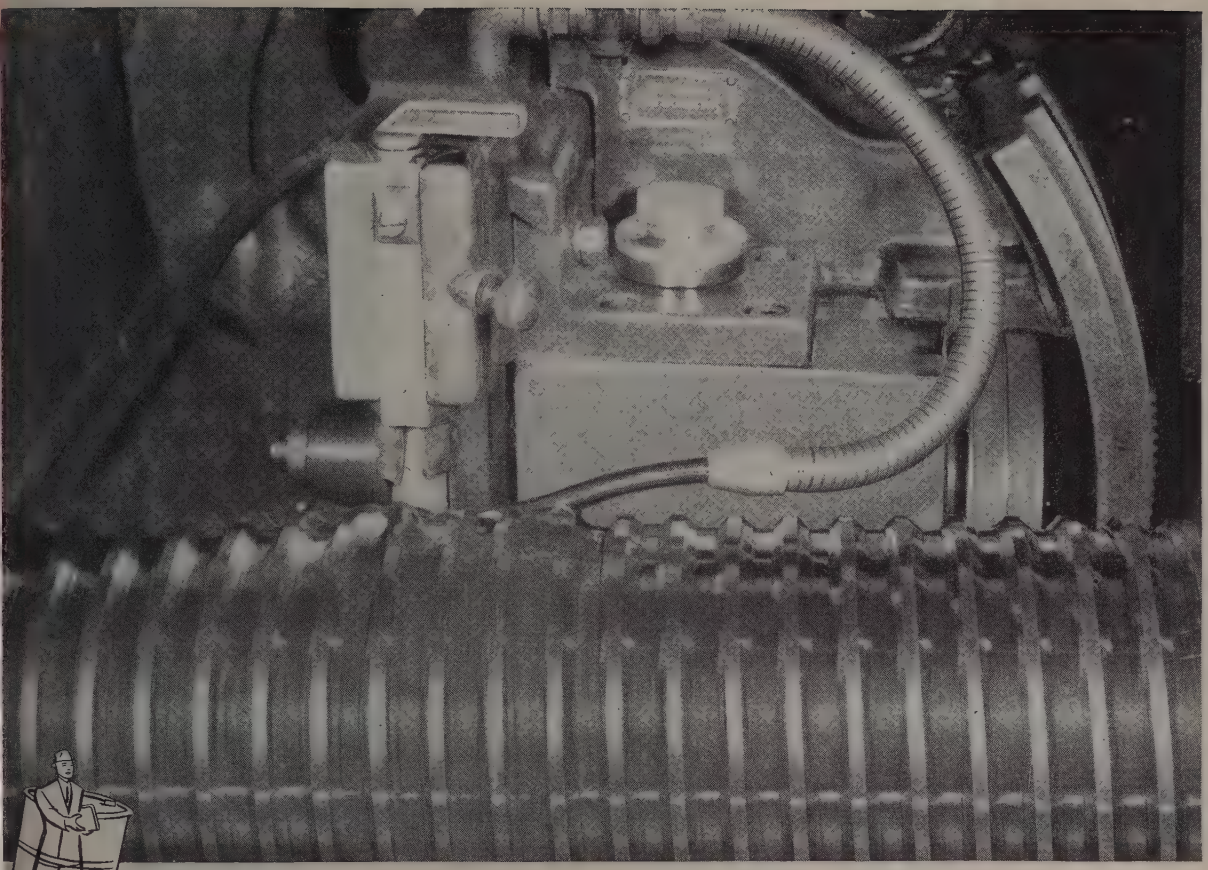
Structural steel demand continue brisk and diversified. Some fabrica tors are booked eight to nine month ahead. In some instances, jobs ar being dropped before reaching th formal bidding stage because of th extended schedules of fabricatin shops. The shortage of steel, in fac is so acute that much heavy con struction, such as barges, is bein held back, and late-season construc tion is being curtailed.

Some fabricating shops are s hampered by the steel shortage the haven't been able to get their week ly operations above four days. Thi is particularly noticeable in the Eas

Fabricated steel prices are stronge There is a growing tendency to pa premium prices, with deliverie lengthening. In estimating fabricate volume for the second and third qua ters, notably bridges, New Englan shops are taking into consideratio the possibility of having to pay high er prices on plain material.

Because of the uncertain suppl

(*Please turn to page* 147)



Ask "the Man in the Barrel" to tell you how . . .

A Grinding Oil can *make* or *break* precision grinding jobs!

If you're using *just a coolant* or ıy oil that happens to be handy r those precision grinding jobs . . . 's costing you money!

A grinding oil can make or break precision grinding job such as ıread grinding, gear grinding and any types of form grinding. Grind-ıg oils are usually classified as ıard-acting" or "soft-acting" de-ending on how they affect grinding heel hardness. Grinding oil char-cteristics must be closely co-ordi-ıted with wheel characteristics, ıeeds, feeds, and material machin-ıility and hardness to obtain aximum performance.

When form grinding low hardness materials, where wheel form is important, a "hard-acting" oil helps to maintain proper wheel form by making the wheel act harder. As a result, greater wheel life is obtained and more accurate parts are produced.

When a high hardness material is being ground there is a tendency for the wheel to load-up and glaze. Such a condition is the cause of burnt work surfaces and heat checks, and is often encountered when grinding taps, gauges and other hardened parts. A "soft-acting" grinding oil will make the wheel act softer, opening up the wheel and exposing new abrasive grains to do the work.

Stuart's complete line of grinding oils have been chemically balanced and scientifically tested to meet the demands of various types of precision grinding operations. "The Man in the Barrel," your trained Stuart Representative, will be happy to assist you in selecting the proper grinding oil for your particular needs. Ask to have him call . . . and ask for a Stuart's Precision Grinding Oil Bulletin, too.

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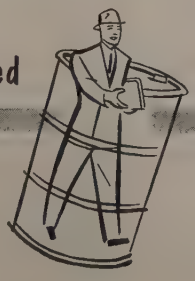

Stuart Oils

Time Tested Cutting Fluids and Lubricants

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ınch Warehouses and Representatives in princi-l metal working centers in the United States, ınada and Europe.

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Ores

Lake Superior Iron Ore

(Prices effective for the 1955 shipping season, gross ton, 51.50% iron natural, rail of vessel, lower lake ports)

Old range bessemer	$10.40
Old range nonbessemer	10.25
Mesabi bessemer	10.25
Mesabi nonbessemer	10.10
Open-hearth lump	11.25
High phosphorus	10.00

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

Foundry and basic 52-62% concentrates contract	17.00-18.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60-68%	20.00
N. African hematite (spot)...nom.	18.00-20.00
Brazilian iron ore, 68-69% (spot)	24.00-26.00

Tungsten Ore

Net ton unit, before duty

Foreign, wolframite, good commercial quality	*$30.00-$31.00*
Domestic, scheelite, mine	63.00

Manganese Ore

Mn 48%, nearby, 95c-$1.05 per long ton unit, c.i.f. U. S. ports, duty for buyer's account; 46-47%, 75c-80c.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and African	
48% 2.8:1	nom. $45.00-$50.00
48% 3:1	42.00-44.00
48% no ratio	34.00
South African Transvaal	
44% no ratio	$19.00-$20.00
48% no ratio	32.00
Domestic	
Rail nearest seller	
18% 3:1	$39.00

Molybdenum

Sulphide concentrate, per lb of Mo content, mines, unpacked	$1.00

Antimony Ore

Per unit of Sb content, c.i.f. seaboard

55-60%	$3.60-$3.85
60-65%	3.85-4.00

Vanadium Ore

Cents per lb V_2O_5 content, deld. mills

Domestic	31.00

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., $122; Salina, Pa., $127; Niles, O., $133.

Super-Duty: St. Louis, $150.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Portsmouth, O., Hawston, Pa., $128; Warren, Niles, O., Hays, Pa., $133; Morrisville, Pa., $131.50; E. Chicago, Ind., Joliet, Rockdale, Ill., $138; Lehigh, Utah, $144; Los Angeles, $151.

Super Duty. Hays, Sproul, Hawston, Pa., Warren, Windham, O., Athens, Tex., $145; Morrisville, Pa., Niles, O., $148; Joliet, Ill., $151; Curtner, Calif., $163.

Semisilica Brick (per 1000)

Clearfield, Pa., $139; Philadelphia, $124; Woodbridge, N. J., $122.

Insulating Fire Brick (per 1000)

2300° *F:* Massillon, O., $178.50; Clearfield, Pa., $213; Augusta, Ga., Beaver Falls, Zelienople, Pa., Mexico, Mo., $206; Vandalia, Mo., $214.10; Portsmouth, O., $207.50; Bessemer, Ala., $212.80.

Ladle Brick (per 1000)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Mexico, Mo., $88.50; Wellsville, O., $92.50; Clearfield, Pa., Portsmouth, O. $98.

High-Alumina Brick (per 1000)

50 *Per Cent:* Clearfield, Pa., St. Louis, Mexico, Mo., $194; Danville, Ill., $197; Philadelphia, $201

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Clearfield, Pa., $241; Danville, Ill., $244; Philadelphia, $248.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $279; Danville, Ill., $281; Clearfield, Pa., Philadelphia, $286.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $157; Clearfield, Pa., $158.50; St. Louis, $169.30.

Nozzles (per 1000)

Reesdale, Pa., $253.70; Johnstown, Pa. $259.20, Clearfield, Pa., $259.40; St. Louis, $259.45; Bridgeburg, Pa., $286.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $196 Clearfield, Pa., $198; St. Louis, $195.80.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blu Bell, Williams, Plymouth Meeting, York, Pa. Millville, W. Va., Bettsville, Millersville, Mar tin, Woodville, O., Gibsonburg, Narlo, O., $15 Thornton, McCook, Ill., $15.60; Dolly Siding Bonne Terre, Mo., $14.

Magnesite (per net ton)

Domestic, dead-burned, bulk, ⅛-in. grains wit fines: Chewelah, Wash., $40; Luning, Nev. $40. ⅜-in. grains with fines: Baltimore $66.40.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, furnace	$13.25-$14.0
Connellsville, foundry	16.00-17.0

Oven Foundry Coke

Kearny, N. J., ovens	$25.5
Camden, N. J., ovens	25.0
Everett, Mass., ovens	
New England, deld.	*27.0
Chicago, ovens	25.7
Chicago, deld.	27.2
Terre Haute, Ind., ovens	25.5
Milwaukee ovens	26.2
Indianapolis, ovens	25.5
Portsmouth, O., ovens	24.7
Cincinnati, deld.	27.3
Painesville, O., ovens	26.2
Cleveland, deld.	28.1
Birmingham, ovens	24.4
Cincinnati, deld.	29.3
Buffalo, ovens	25.7
Buffalo, deld.	27.0
Lone Star, Tex., ovens	19.5
Neville Island, Pa., ovens	25.0
Philadelphia, ovens	25.0
Swedeland, Pa., ovens	25.0
St. Paul, ovens	25.0
Detroit, ovens	26.2
Detroit, deld.	27.2
Pontiac, deld.	27.8
Saginaw, deld.	29.3

*Or within $4.55 freight zone from works.

Coal Chemicals

Spot, cents per gallon, ovens

Pure benzene	36.0
Toluene, one deg.	32.00-34.0
Industrial xylene	32.00-35.0

Per ton, bulk, ovens

Ammonium sulphate	$42-$45
Birmingham area	42.00†

†With port equalization against imports.

Cents per pound, producing point

Phenol: Grade 1, 15.00; Grade 2-3, 14.50; Grade 4, 16.50; Grade 5, 15.25.

Fluorspar

Metallurgical grades, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF content 72.5%, $38-$39; 70%, $35-$36; 60% $31-$32. Imported, net tons, f.o.b. cars point o entry, duty paid, metallurgical grade: Europe an, $34; Mexican, $25.50.

Electrodes

Threaded with nipple, unboxed, f.o.b. plan

Inches Diam	Length	Per 100 lb
GRAPHITE		
2	24	$52.5
2½	30	33.7
3	40	32.0
4	40	30.2
5½	40	30.0
6	60	27.2
7	60	26.7
8, 9, 10	60	24.2
12	72	27.2
14	60	23.5
16	72	22.5
17	60	23.0
18	72	22.5
20	72	22.2
CARBON		
8	60	12.1
10	60	11.8
12	60	11.7
14	60	11.7
14	72	10.8
17	60	10.7
17	72	10.3
20	84	10.3
20	90	10.1
24	72, 84	10.3
24	96	10.0
30	84	10.2
40, 35	110	9.9
40	100	9.9

Lamson

1035 CAP SCREWS OFFER GREATER STRENGTH AT...

Less Cost!

If you are now using Full Finished Screws in your assembly operations it will pay you to consider substituting Lamson 1035 Double Heat Treated Cap Screws.

The extra relative toughness of Lamson 1035's enables you to use screws of smaller diameter, yet with equal, or greater, tensile strength.

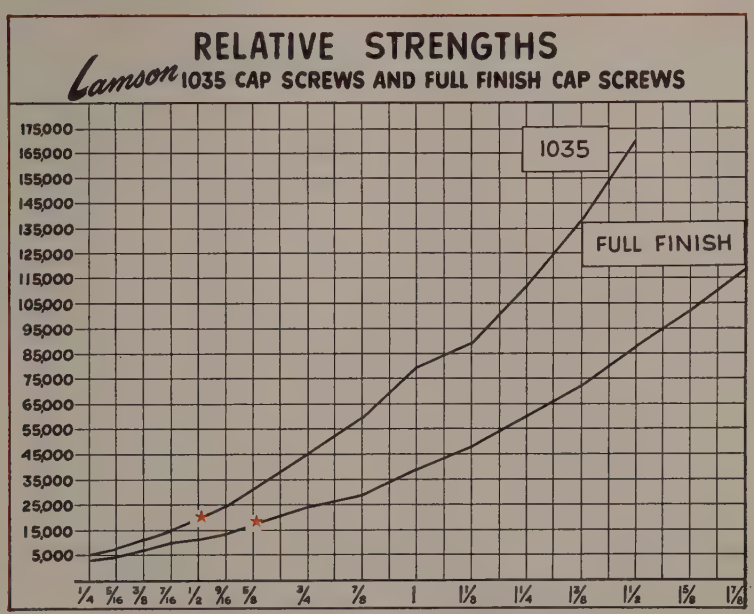
As an example of increased strength at less cost—on the chart below you will see that a ½"★ diameter Lamson 1035 Cap Screw has greater tensile strength than a ⅝"★ diameter Full Finished Cap Screw. This means savings in weight and size of assembly.

As for money savings—Lamson ½" x 2" 1035 Cap Screws are net priced at $5.36 per hundred as compared to $7.59 per hundred for the ⅝" x 2" Full Finished Screw. Proportionate savings can be made all along the line.

Lamson 1035 Double Heat Treated High Tensile Cap Screws have long been favorites where extra strength and durability is required.

To attain this extra strength, Lamson Cap Screws are first heat treated at about 1600° F. and then quenched. This imparts "hardness". Then the screws are "drawn", or re-heated, to between 900° F. and 1100° F. and then quenched in a special oil.

This results in a minimum tensile strength of 150,000 pounds per square inch.



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Current Ferroalloy Quotations

MANGANESE ALLOYS

Spiegeleisen: Carlot, per gross ton, Palmerton, Pa. 21-23% Mn, $90.50; 19-21% Mn, 1-3% Si, $88; 16-19% Mn, $86.

Standard Ferromanganese: (Mn 74-76%, C 7% approx.) Base price per net ton $190, Clairton, Duquesne, Johnstown and Sheridan, Pa.; Alloy, W. Va.; Ashtabula, Marietta, Philo, O.; Sheffield, Ala.; Portland, Oreg., and Tacoma, Wash. Add or subtract $2.00 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively.

(Mn 79-81%). Lump $198 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 76%, fractions in proportion to nearest 0.1%.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max, 0.07% C, 29.95c per lb of contained Mn, carload packed 30.7c, ton lots 31.8c, less ton 33c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max 0.30% C, 3.5c for max 0.50% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk 21.85c per lb of contained Mn, packed, carload 22.9c, ton lot 24.5c, less ton 25.7c. Delivered. Spot, add 0.25c.

Manganese Metal: 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2% max): Carload, lump, bulk, 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lots 49.25c. Delivered. Spot, add 2c.

Electrolytic Manganese Metal: Min carloads, 30c; 2000 lb to min carloads, 32c; 250 lb to 1999 lb 34c. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or to any point east of Mississippi; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk 1.50% C grade, 18-20% Si, 11.2c per lb of alloy. Packed, c.l. 12.2c, ton 12.65c, less ton 13.65c, f.o.b. Alloy, W. Va., Ashtabula, O., Marietta, O., Sheffield, Ala., Portland, Oreg. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lots 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lots $1.35, less ton $1.37 f.o.b. Niagara Falls, N.Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $177 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%). Contract $195 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk 26.25c per lb of contained Cr; c.l. packed 27.5c, ton lot 29.25c, less ton 30.65c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-71%). Contract, carload, lump, bulk, C 0.025% max (Simplex) 31.75c per lb contained Cr, 0.02 max 38.50c, 0.03 max 38c, 0.06 max 36.50c, 0.1 max 36c, 0.15 max 35.75c, 0.2 max 35.50c, 0.5 max 35.25c, 1.0 max 34c, 1.5 max 33.85c, 2.0 max 33.75c. Ton lot, add 3.1c, less ton add 4.8c. Carload packed add 1.45c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). Contract, c.l. 8 M x D, bulk 27.4c per lb contained Cr. Packed c.l. 28.7c, ton 30.5c, less ton 32c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, Low-Carbon: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carloads, packed 8 M x D, 19.6c per lb of alloy, ton lot 20.85c; less ton lot, 22.05c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome-Silicon: (Cr 34-41%, Si 42-49%, C 0.05% max). Contract, carload, lump, 4" x down and 2" x down, bulk, 39.05c per lb of contained Cr; 1" x down, bulk 39.8c. Delivered.

Chromium Metal, Electrolytic: Commercial grade (Cr 99.2% min, Fe 0.2 max). Contract, carlot, packed 2" x D plate (about ⅛" thick) $1.25 per lb, ton lots $1.27, less ton lots $1.28. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth Grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.10 per lb of contained V. Delivered. Spot, add 10c. **Special Grade** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.20. **High Speed Grade** (V 50-55%, or 70-75%, Si 1.50% max, C 0.20% max) $3.30.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lots, packed, $1.33 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.0c per lb of contained Si, Packed 21.40c; ton lot 22.50c f.o.b. Niagara Falls, freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contact, carload, lump, bulk, 11.75c per lb of contained Si. Packed, c.l. 13.85c, ton lot 15.3c, less ton 16.95c. F.o.b. Alloy, W. Va., Ashtabula, O., Marietta, O., Sheffield, Ala., and Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.2c to 50% ferrosilicon prices.

65% Ferrosilicon: Contract, carload, lump, bulk, 14.5c per pound contained silicon. Packed, c.l. 16.2c, ton lots, 18c; less ton, 19.35c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 15.4c per lb of contained Si. Packed c.l. 17.05c, ton lot 18.7c, less ton 19.95c. Delivered. Spot, add, add 0.3c.

90% Ferrosilicon: Contract, carload, lump, bulk, 18.5c per lb of contained Si. Packed, c.l. 19.95c, ton lot 21.35c, less ton 22.4c. Delivered. Spot, add 0.25c.

Silicon Metal: (Min 98% Si, 0.75% max Fe. 0.07 max Ca). C.l. lump, bulk, 20.5c per lb of Si. Packed, c.l. 21.95c, ton lot 23.25c, less ton 24.25c. Add 0.5c for max 0.03 Ca grade. Deduct 0.5c for max 2% Fe grade analyzing min 96.5% Si. Spot, add 0.25c.

Alsifer: (Approx, 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 10.65c per lb of alloy, ton lots packed 11.8c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l. lump, bulk 8.5c. per lb of alloy. Packed, c.l. 9.5c, ton lot 10.65c, less ton 11.5c. Delivered. Spot add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 26.25c per lb of alloy, ton lot 27.4c, less ton 28.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot add 5c. F.o.b. Washington, Pa., prices, 100 lb and over, are as follows: Grade A (10-14% B) 85c per pound; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). $5.25 per lb contained B, delivered to destination.

Bortam: (B 1.5%-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 1 to 2%). Contract, lump, carloads 9.50c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, 14-18% and Si 53-59%). Contract, carlo lump, bulk 22c per lb of alloy, carload pack 23.05c, ton lot 24.95c, less ton 25.95c. livered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, 1.5-3%). Contract, carload, lump, bulk 21 per lb of alloy, carload packed 22.95c, lot 25.25c, less ton 26.75c. Delivered. Spot, 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3⅜ each and containing exactly 2 lb of Cr). C tract, carload, bulk, 16.95c per lb of briqu carload packed in box pallets 17.15c, in ba 17.85c; 3000 lb to c.l. in box pallets 18.3 2000 lb to c.l. in bags, 19.05c; less than 2 lb in bags 19.95c. Delivered. Add 0.25c notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing appr 3 lb and containing exactly 2 lb of M Contract, carload, bulk 12.1c per lb of briqu c.l. packed, pallets 12.3c, bags 13.1c; 3 lb to c.l., pallets 13.5c; 2000 lb to c.l., ba 14.3c, less ton 15.2c. Delivered. Add 0.25c notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing appr 3½ lb and containing exactly 2 lb of Mn a approx. ½ lb of Si). Contract, c.l. bulk 12 per lb of briquet, c.l. packed, pallets, 12.9 bags 13.7c, 3000 lb to c.l., pallets, 14.1c; 2 lb to c.l., bags, 14.9c; less ton 15.8c. Deliver Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing prox. 5 lb and containing exactly 2 lb of S Contract, carload, bulk 6.75c per lb of briqu packed, pallets, 6.95c; bags, 7.75c; 3000 lb c.l., pallets, 8.55c; 2000 lb to c.l. bags 9.3 less ton 10.25c. Delivered. Spot, add 0.25c.

(Small size—Weighing approx. 2¼ lb and co taining exactly 1 lb of Si). Carload, bu 6.9c. Packed, pallets 7.1c; bags 7.9c; 3 lb to c.l. pallets 8.7c; 2000 to c.l. bags 9.5 less ton 10.4c. Delivered. Add 0.25c for not ing, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ of Mo each) $1.14 per pound of Mo contain f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%), 5000 lb W or m $3.45 per lb of contained W; 2000 lb W 5000 lb W, $3.55; less than 2000 lb W, $3. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 8% m C 0.4% max). Contract, ton lot, 2" x $6.90 per lb of contained Cb. Delivered. Sp add 10c.

Ferrotantalum—Columbium: (Cb 40% appro Ta 20% approx., and Cb plus Ta 60% min 0.30% max). Ton lots, 2" x D, $4.65 per of contained Cb plus Ta, delivered; less lots $4.70.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8 Zr 3-5%, Ti 9-11%, B 0.55-0.75%). Carlo packed 1" x D, 45c per lb of alloy, ton 47c, less ton 49c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7 Fe 20% approx.). Contract, c.l. packed ½" 12 M, 18.5c per lb of alloy, ton lots 19.6 less ton 20.9c. Delivered. Spot, add 0.25c.

Graphidox No. 5: (Si 48-52%, Ca 5-7%, Ti 11%). C.l. packed, 18.5c per lb of alloy, lots 19.65c; less ton lots 20.9c, f.o.b. Niaga Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19 Mn 8-11%). C.l. packed 17.2c per lb of all ton lots 18.7c; less ton lots 19.95c. f.o Niagara Falls; freight allowed to St. Louis.

Siminal: (Approx. 20% each Si, Mn, Al; b Fe). Lump, carload, bulk 16.50c. Packed 17.50c, 2000 lb to c.l. 18.50c, less than 2 lb 19c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% content with unitage of $4 for each 1% of above or below the base); carloads, f.o sellers' works, Mt. Pleasant, Siglo, Tenn., per gross ton.

Ferromolybdenum: (55-75%). Per lb c tained Mo, in 200-lb containers, f.o.b. Lan loth, Pa., $1.46 in all sizes except powde which is $1.57; Washington, Pa., furna any quantity $1.46.

Technical Molybdic-Oxide: Per lb contai Mo, f.o.b. Langeloth, Pa., $1.25 in cans; bags, $1.24, f.o.b. Langeloth, Pa.; $1. Washington, Pa.

(*Concluded from page* 140)

utlook, more shops are unwilling to nter long-term contracts.

Continued tightening in supply is xpected over the coming months. 'roducers will enter the new year vith carry-overs so hefty a consider- ble portion of first quarter produc- ion will have to be blanked out. Meanwhile, demand is building up. Heavy tonnage is being placed for he Connecticut highway program.

About 12,000 tons of steel will be equired for a new graving dock for he New York Shipbuilding Corp., Camden, N. J. Included are more than 00,000 lineal feet of sheet steel piling nd five miles of 2-to-10-in. pipe. The ock will be equipped with two 80-ton nd four 40-ton traveling whirler ranes.

teel Output Breaks Records

The nation's furnaces poured more teel in October than ever before in single month, reports the American ron & Steel Institute. Output to- aled 10,502,000 net tons, bringing roduction for the first ten months f the year to 96,286,118 tons, also new record.

The previous record for a compar- ble ten-month period was in 1953 94,973,339 tons). In the first ten nonths of 1954, only 71,935,152 tons ere produced.

October was the third month in istory of more than 10 million tons of production. The other two were March, 1953, with 10,168,098 tons, and May, 1955, with 10,328,316 tons. October production this year was about 620,000 tons above the 9,882,325 tons reported for September. A year ago in October, output totaled 7,- 701,533 tons.

The index of production for Octo- ber this year was 147.6, compared with 143.5 in the preceding month and 108.3 in October a year ago. The index for the first ten months was 138.

October production was at 98.2 per cent of the Jan. 1, 1955, capacity of 125,828,310 tons. Output in the first ten months was at 91.9 per cent of capacity. In 1954, when capacity was rated at 124.3 million tons, produc- tion during October was at 72.9 per cent of capacity, the first ten months, 69.5 per cent.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

7350 tons, bridge superstructure, Housatonic river bridge, Connecticut turnpike, Stratford-Milford, Conn., project 313-02, to American Bridge Division, U. S. Steel Corp., Pitts- burgh, direct; 34-span structure, 1475 tons low alloy steel included girder spans; also 875 tons, reinforcing bars.

3425 tons, bridge superstructure, Saugatuck river, Westport, Conn., project 307-04, di- rect, to Phoenix Bridge Co., Phoenixville, Pa.; ten riveted plate girder spans with reinforced concrete deck, 425 tons, bars.

2900 tons, 11 grade separation structures and bridge over New Haven Railroad, Connecti- cut turnpike, Darien-Norwalk-Westport, Conn., projects 306-03 and 307-01, to Harris Structural Steel Co., New York; Savin Con- struction Co., Hartford, Conn., general con- tractor; contract also includes substructure, Saugatuck river bridge, Westport, Conn., additional steel, 1525 tons, reinforcing bars; 295 tons, steel piles, and 220 tons, steel sheet piling.

2325 tons, six overpassing and two under- passing structures, Connecticut turnpike, Milford, Conn., project 314-03, to Harris Structural Steel Co., New York; Savin Con- struction Co., Hartford, general contractor; contract also includes 800 tons, reinforcing bars, and 590 tons, steel piles.

1400 tons, municipal incinerator, Greenpoint, Brooklyn, N. Y., to Lehigh Structural Steel Co., Allentown, Pa.

1250 tons, state bridges, Southeast expressway, Boston-Milton, Mass., to American Bridge Division, U. S. Steel Corp., Pittsburgh, through the Savin Construction Co., Hart- ford, Conn., general contractor.

600 tons, five beam bridges, Spaulding turn- pike, Dover, N. H., to American Bridge Divi- sion, U. S. Steel Corp., Pittsburgh, through Landers & Griffin Inc., Portsmouth, N. H., general contractor.

300 tons, senior high school, Willsboro, Pa., to the Anthracite Bridge Co., Scranton, Pa.

225 tons, two-span girder bridge, Connecticut turnpike, East Avenue, Norwalk, Conn., to Bethlehem Steel Co., Bethlehem, Pa.; Mari- ani Construction Co., New Haven, general contractor.

205 tons, two-span girder bridge, Wilbur Cross highway, Tolland, Conn., to Phoenix Bridge Co., Phoenixville, Pa.; D. Arrigoni Co., Middletown, Conn., general contractor.

130 tons, Du Pont project, Seford, Del., to Bethlehem Fabricators, Bethlehem, Pa.

STRUCTURAL STEEL PENDING

4000 tons, buildings 40 and 41, Creedmoor State Hospital, Long Island, N. Y., bids closed by the New York State Department of Public Works, Nov. 17.

3500 tons, 49 intake gates, Barnhart Island power plant and eight gates, Massena plant; bids Nov. 30, Power Authority, State of New York, New York.

2000 tons, transformation of riding academy into an academic hall, West Point Mili- tary Academy, West Point, N. Y.; plans by Army Engineers, New York District, New York, with bids to be in early next month.

763 tons, state bridge work, York county, Pa.; bids Dec. 2. Also required, are 550 tons of reinforcing bars.

Period	——OPEN HEARTH—— Net tons	Per cent of capacity	‡Index	——BESSEMER—— Net tons	Per cent of capacity	‡Index	——ELECTRIC—— Net tons	Per cent of capacity	‡Index	——TOTAL—— Net tons	Per cent of capacity	‡Index	Calculated weekly production (Net tons)	Number of weeks in month
1955														
January	8,054,345	86.0	125.7	199,229	49.0	56.7	584,162	63.6	163.6	8,837,736	82.7	124.2	1,994,974	4.43
February	7,734,884	91.5	133.7	197,091	53.7	62.1	564,959	68.1	175.1	8,496,934	88.0	132.2	2,124,233	4.00
March	9,060,026	96.7	141.4	255,493	62.8	72.7	666,235	72.6	186.5	9,981,754	93.4	140.3	2,253,281	4.43
1st Quarter	24,849,255	91.4	133.6	651,813	55.2	63.9	1,815,356	68.1	175.1	27,316,424	88.0	132.3	2,124,139	12.86
April	8,858,549	97.7	142.9	275,069	69.8	80.9	681,477	76.6	197.2	9,815,095	94.8	142.6	2,287,901	4.29
May	9,307,291	99.4	145.3	305,347	75.1	86.9	715,678	77.9	200.4	10,328,316	96.6	145.2	2,331,448	4.43
June	*8,764,430	96.6	141.4	283,544	72.0	83.4	*698,493	78.6	202.1	9,746,467	94.1	141.6	2,271,904	4.29
2nd Quarter	*26,930,270	97.9	143.2	863,960	72.3	83.8	*2,095,648	77.7	199.9	29,889,878	95.2	143.1	2,297,454	13.01
1st 6 Months	*51,779,525	94.7	138.5	1,515,773	63.8	73.9	*3,911,004	72.9	187.5	57,206,302	91.6	137.7	2,211,299	25.87
July	8,232,535	88.1	128.5	268,348	66.1	76.4	600,063	65.5	168.0	9,100,946	85.3	127.9	2,059,038	4.42
August	8,600,612	91.8	134.3	298,972	73.5	85.1	694,000	75.7	194.6	9,594,545	89.7	134.9	2,165,812	4.43
September	8,829,266	97.6	142.4	307,171	78.2	90.3	745,888	84.1	215.8	9,882,325	95.7	143.5	2,308,954	4.28
3rd Quarter	25,662,413	92.4	135.0	874,491	72.6	83.9	2,040,912	75.0	192.5	28,577,816	90.2	135.4	2,176,528	13.13
9 Months	77,441,938	93.9	137.3	2,390,264	66.8	77.2	5,951,916	73.6	189.2	85,784,118	91.1	136.9	2,199,593	39.00
October	9,374,000	100.1	146.3	330,000	81.1	93.9	798,000	86.9	223.4	10,502,000	98.2	147.6	2,371,000	4.43
1954														
January	7,256,526	78.3	113.3	260,453	64.0	74.1	434,507	48.9	121.7	7,951,486	75.3	111.8	1,794,918	4.43
February	6,523,213	77.9	112.8	174,253	47.4	54.9	385,771	48.1	119.6	7,083,237	74.3	110.2	1,770,809	4.00
March	6,649,667	71.7	103.8	207,726	51.1	59.1	432,207	48.7	121.0	7,289,600	69.0	102.5	1,645,508	4.43
1st Quarter	20,429,406	75.9	109.9	642,432	54.4	63.0	1,252,485	48.6	120.8	22,324,323	72.8	108.1	1,735,950	12.86
April	6,365,326	70.9	102.7	162,657	41.3	47.8	442,954	51.5	128.2	6,970,937	68.1	101.3	1,624,927	4.29
May	6,817,951	73.6	106.4	198,063	48.7	56.4	456,724	51.4	127.9	7,472,738	70.7	105.0	1,686,848	4.43
June	6,702,006	74.7	108.1	207,666	52.7	61.1	453,962	52.8	131.3	7,363,634	72.0	107.0	1,716,465	4.29
2nd Quarter	19,885,283	73.1	105.8	568,386	47.6	55.1	1,353,640	51.9	129.1	21,807,309	70.3	104.4	1,676,196	13.01
1st Half	40,314,689	74.5	107.8	1,210,818	51.0	59.0	2,606,125	50.3	125.0	44,131,632	71.5	106.2	1,705,900	25.87
July	6,040,120	65.3	94.3	205,313	50.6	58.4	382,164	43.1	107.0	6,627,597	62.9	93.2	1,499,456	4.42
August	6,021,496	65.0	94.0	217,837	53.6	62.0	427,574	48.2	119.7	6,666,907	63.1	93.7	1,504,945	4.43
September	6,140,266	68.6	99.1	214,065	54.5	63.0	453,152	52.8	131.1	6,807,483	66.7	98.9	1,590,533	4.28
3rd Quarter	25,661,147	92.4	135.0	874,320	72.5	83.8	1,262,890	48.0	119.1	20,101,987	64.2	95.2	1,530,997	13.13
9 Months	77,440,672	93.9	137.3	2,390,093	66.8	77.2	3,869,015	49.5	123.0	64,233,619	69.1	102.5	1,647,016	39.00
October	6,973,568	75.2	108.9	237,754	58.5	67.7	490,211	55.2	137.3	7,701,533	72.9	108.3	1,738,495	4.43
November	7,307,151	81.4	117.9	231,191	58.7	68.0	551,085	64.1	159.4	8,089,427	79.1	117.5	1,885,647	4.29
December	7,530,204	81.4	117.6	231,126	57.0	65.8	525,743	59.4	147.2	8,287,073	78.6	116.5	1,874,903	4.42
4th Quarter	21,810,923	79.3	114.7	700,071	58.0	67.1	1,567,039	59.5	147.8	24,078,033	76.8	114.0	1,832,423	13.14
2nd Half	40,012,805	72.8	105.2	1,337,286	55.4	64.1	2,529,929	53.8	133.5	44,180,020	70.5	104.6	1,681,767	26.27
Total	80,327,494	73.6	106.5	2,548,104	53.2	61.6	5,436,054	52.0	129.3	88,311,652	71.0	105.4	1,693,741	52.14

Note—The percentages of capacity operated are calculated on weekly capacities in 1955 of 2,114,196 net tons open hearth, 91,810 net tons bessemer and 207,272 net tons electric ingots and steel for castings, total 2,413,278 net tons; based on annual capacities as of Jan. 1, 1955, as follows: Open hearth 110,234,160 net tons, bessemer 4,787,000 net tons, electric 10,807,150 net tons, total 125,828,310 net tons.

Note—The percentages of capacity operated are calculated on weekly capacities in 1954 of 2,092,342 net tons open hearth, 91,810 net tons bessemer and 200,397 net tons electric ingots and steel for castings, total 2,384,549 net tons; based on annual capacities as of Jan. 1, 1954, as follows: Open hearth 109,094,730 net tons, bessemer 4,787,000 net tons, electric 10,448,680 net tons, total 124,330,410 net tons.

‡Revised. †Preliminary figures, subject to revision. ‡Index of production based on average weekly production of the three years 1947-1948-1949.

335 tons, railroad replacement project, Gorge dam improvement, King county, Washington; bids to U. S. Engineer, Seattle, Dec. 6.
170 tons, girder bridge, Greenfield, Mass.; bids in.
125 tons, state highway bridge, Woolwich, Me.; bids Nov. 23, Augusta, Me.
115 tons, state highway bridge, Walpole, Mass.; also 100 tons, steel piles.
100 tons plus, including reinforcing bars, gates, etc., East Low canal, Columbia Basin project; bids to the Bureau of Reclamation, Ephrata, Wash., Dec. 15.
Unstated, bulk supply warehouse, Eielson Air Field, Alaska; Baker & Ford, Bellingham, Wash., low at $674,707 to U. S. Engineer.

REINFORCING BARS . . .

REINFORCING BARS PLACED

185 tons, Noxon Rapids power project, Montana, to Bethlehem Pacific Coast Steel Corp., Seattle; Peter Kiewit & Sons Co., general contractor.
187 tons, Washington state Satus highway bridge, to Bethlehem Pacific Coast Steel Corp., Seattle; Snook Bros., Eugene, Oreg., general contractor.
120 tons, guided missile project, Redmond, Wash., to James D. English Steel Co., Tacoma, Wash.; Kuney-Johnson Co., Seattle, general contractor.
107 tons, Army storage project, Deep Creek, Wash., to Soule Steel Co., Portland, Oreg.; Max J. Kuney Co., Spokane, Wash., low at $654,000 to U. S. Engineer.
100 tons, department store addition, Spokane, Wash., to Northwest Steel Rolling Mills Inc., Seattle.

REINFORCING BARS PENDING

23,000 tons, Priest Rapids dam, Columbia river, Wash., $180 million project; bids will be invited in January by Grand County P.U.D., Ephrata, Wash., Glenn A. Smothers, manager.
136 tons, including 90 tons in Snohomish county, Washington state projects; bids to Olympia, Wash., Nov. 29.
123 tons, Washington state T-beam bridge, Adams county; bids to Olympia, Wash., Nov. 29.
109 tons, flume replacement, Irrigation District, Selah, Wash.; bids Nov. 21.
Unstated, Oregon road projects, general contracts awarded: Multnomah county: 300-ft expressway structure, Lord Bros., Portland, Oreg., low at $294,444; undercrossing to Gibbons & Reed Co., Portland, Oreg., $174,-170; Josephine county, 418-ft reinforced bridge, Ausland Construction Co., Grants Pass, Oreg., $52,580; Wheeler county, 343-ft span to A. H. Saxton & Son, Corvallis, $131,515; Douglas county, 787-ft bridge and 163-ft pass, Valley Construction Co., Portland, Oreg., $427,220; Coos county, 370-ft bridge to Sig Anderson, North Bend, $139,-839; Union Ave. expressway including grading, Portland Oreg., to Gibbons & Reed, Spokane, Wash., $1,097,000.

PLATES . . .

PLATES PLACED

300 tons, 1-million-gal tank, Bellevue, Wash., to Chicago Bridge & Iron Co., Seattle.
120 tons, water storage tank, Quincy, Wash., to American Pipe & Construction Co., Portland, Oreg.
100 tons, sheet piling for inventory, Hansen & Parr, Spokane, Wash., to Bethlehem Pacific Coast Steel Corp., Seattle.

PLATES PENDING

1600 tons, 24 vertical, bolted, knocked-down tanks, 3000-bbl capacity each; bids Nov. 28, Navy, Bureau of Yards and Docks, Port Hueneme, Calif.

RAILS, CARS . . .

LOCOMOTIVES PENDING

Missouri-Kansas-Texas, 550 fifty-ton boxcars and 25 fifty-ton flatcars.
Western Pacific, 410 miscellaneous freight cars. List comprises 275 boxcars, 100 seventy-ton hopper ballast cars, 10 seventy-covered hopper cars and 25 fifty-ton flatcars.

RAILROAD CARS PLACED

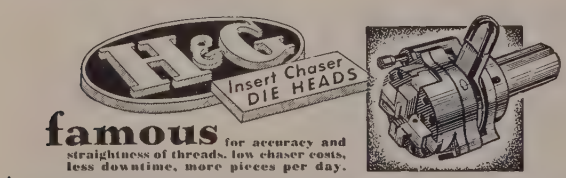
Louisville & Nashville, 1000 freight cars. comprises 500 boxcars, 200 gondolas, p wood cars and 100 flatcars. ACF Industries, New York, Pullman-Standard Mfg. Co., Chicago, and Greenville Car Co., Greenville, Pa., will build the for delivery late next year.
Rutland, 100 fifty-ton boxcars and 15 cov hopper cars to Pullman-Standard Car Co., Chicago.
Northern Pacific, ten lightweight baggage and five parlor-bar-lounge cars to the P man-Standard Car Mfg. Co., Chicago.
Chicago, Rock Island & Pacific, 25 bagg cars, to ACF Industries Inc., New Yor
Erie Mining Co., six 22,000-gal oil tank c to Shippers Carline Corp., New York.
Chesapeake & Ohio, 1000 seventy-ton gond cars, to ACF Industries Inc., New Y List comprises 750 high-side fixed-end and 250 low-side, drop-end cars. Deliv is scheduled to begin in third quarter year.
Reading, 500 seventy-ton gondolas and seventy-ton hoppers, to Bethlehem Steel Bethlehem, Pa.
Northern Pacific, 1000 fifty-ton boxcars 200 ore cars, to its own shops.

RAILS PLACED

Louisville & Nashville, 35,000 tons of 132 rail, to the Tennessee Coal & Iron Divi U. S. Steel Corp., Pittsburgh.

RAILS PENDING

Pennsylvania, unstated tonnage; bids Nov.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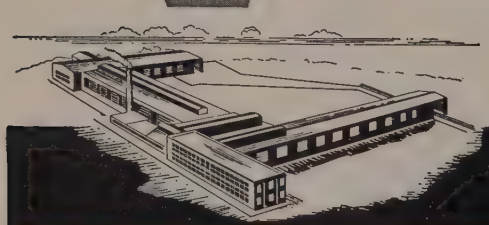

KEYSTONE DRAWN STEEL CO.
SPRING CITY PENNSYLVANIA

crap . . .

Scrap Prices, Page 150

Pittsburgh—Any mill entering the arket for No. 1 heavy melting scrap ould have to pay $46 a ton, it is id. Only two sales of No. 1 heavy ave been reported the last two eeks, and one was to a mill on ie fringe of this district. Heavy de- and from areas west, north and st of Pittsburgh bolsters the local arket. The most lively aspect of rap demand is in railroad sales. rices of rails advanced $1 a ton.

Buffalo—New business is lacking, ut strength dominates the local rap market, with prices unchanged.

Philadelphia—Scrap prices are fea- ured by two advances: Couplers, rings and wheels went up to $53, elivered; malleable rose to $50.50. ie market is generally strong. No. 1 cupola cast has advanced harply to $46, delivered, on buying y U. S. Steel for its Fairless Works.

New York—Brokers have increased eir buying prices on low phos tructural and plate to $42.50-$43.50. rices otherwise are unchanged.

Cincinnati—The situation in the rap market here is mixed. A mited tonnage was purchased by the cal mill, but the price situation not clear. Except for a 50-cent crease in No. 2 heavy melting and o. 2 bundles, prices are steady.

Chicago—Firmness continues in the rap market here, but new buying as not occurred in sufficient volume provide a price test. It is material f dealer origin that arouses little nsumer interest. Currently, there is $3 spread between No. 1 industrial nd No. 1 dealer heavy melting, with ie former pegged at $46 and the tter at $43. There are reports that ealers have been paying $43.

Boston — Except for a slightly rmer tone in No. 2 heavy melting teel for delivery to eastern Pennsyl- ania, steel scrap prices are un- anged. Cast iron grades are retain- g their recent strength on district elivery tonnage. Brokers are paying p to $40, shipping point, for No. 1 ort steel. No. 2 bundles, delivered dock for export, are $1 higher an domestic shipment tonnage.

Birmingham—With supplies tight- ing in all grades, some scrap deal- rs are holding material for inven- ry in anticipation of higher prices. rices are unchanged generally, but eports persist that higher levels are eing paid for special lots of steel- aking materials. Connors Steel ivision, the H. K. Porter Company nc., is buying No. 2 bundles, with lectric furnace bundles scarce.

Los Angeles—Scrap dealers report market softness following the recent firming up of prices. Some mills purchased more than their immediate needs when rumors of price increases began circulating.

San Francisco—Steel scrap prices are steady at the recently established higher levels. Deliveries may be slowed by heavy rains.

Cleveland—Prices throughout the list are steady, despite the absence of representative buying. Heavy tonnage is moving to consumers against old orders. There is considerable competition for the quality grades of material.

St. Louis—Scrap prices are firming. Rail offerings are dwindling. Shipments from country points are fair.

Seattle — While $44 and $40 are quoted on No. 1 and No. 2 heavy melting steel, respectively, scrap consumers expect a moderate dip in prices. They assert that the market is too high. High prices have attracted heavy shipments to tidewater.

Japan is still interested in tonnage, but exporters wonder how long that country can afford to pay $60 a ton.

Rails, Cars . . .

Track Material Prices, Page 135

The Louisville & Nashville Railroad has ordered 35,000 net tons of 132-lb steel rails from the Tennessee Coal & Iron Division, U. S. Steel Corp. They will cost $5,600,000. The road also ordered an unspecified number of freight cars from the Bessemer, Ala., plant of Pullman-Standard Car Mfg. Co. at a cost of $3,300,000.

Iron Ore . . .

Iron Ore Prices, Page 142

Shipments of Lake Superior iron ore totaled 2,301,801 gross tons in the week ended Nov. 14, reports the Lake Superior Iron Ore Association. This compares with 909,659 tons moved in the like week of 1954.

Up to Nov. 14, cumulative shipments in the 1955 navigation season were 84,079,732 tons. On the same date last year, shipments amounted to only 59,790,113 tons.

Pig Iron . . .

Pig Iron Prices, Page 137

Some pig iron sellers believe November business will establish a new high for the year, despite fewer working days. The gain in bookings is due in part to the accumulation of inventories by foundries in anticipation of winter and sustained high level consumption

New England shops supplying castings for machine tools are more ac-

(*Please turn to page* 152)

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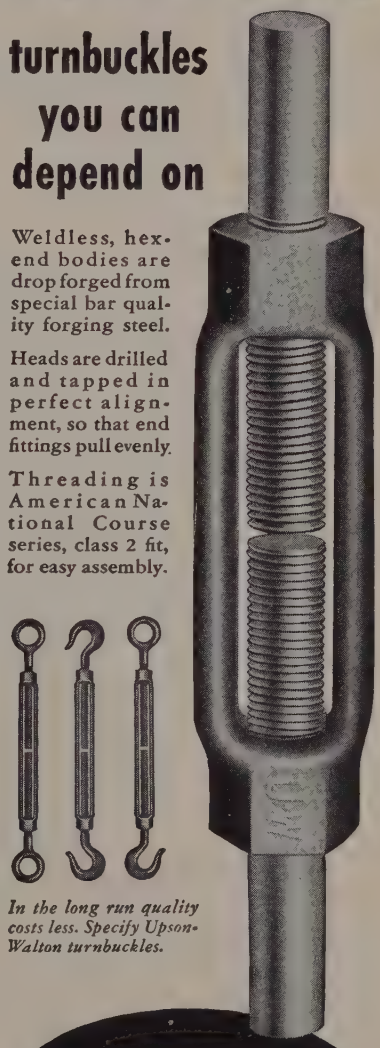

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Iron and Steel Scrap

Consumer prices, per gross ton, except as otherwise noted, including broker's commission, as reported STEEL. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Nov. 16	$45.67
Nov. 9	45.33
Oct. Avg.	45.17
Nov. 1954	33.33
Nov. 1950	41.33

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

(Delivered consumer's plant)

No. 1 heavy melting	*45.00-46.00*
No. 2 heavy melting	40.00-41.00
No. 1 bundles	*45.00-46.00*
No. 2 bundles	36.00-37.00
No. 1 busheling	*45.00-46.00*
Machine shop turnings	29.00-30.00
Mixed borings, turnings	29.00-30.00
Short shovel turnings	33.00-34.00
Cast iron borings	33.00-34.00
Cut structurals, 3 ft lengths	49.00-50.00
Heavy turnings	42.00-43.00
Punchings & plate scrap	49.00-50.00
Electric furnace bundles	48.00-49.00

Cast Iron Grades

No. 1 cupola	42.00-43.00
Charging box cast	39.00-40.00
Heavy breakable cast	39.00-40.00
Unstripped motor blocks	29.00-30.00
No. 1 machinery cast	50.00-51.00

Railroad Scrap

No. 1 R.R. heavy melt.	49.00-50.00
Rails, 2 ft and under	*59.00-60.00*
Rails, 18 in. and under	*60.00-61.00*
Rails, random lengths	*56.00-57.00*
Railroad specialties	54.00-55.00

Stainless Steel Scrap

18-8 bundles & Solids	270 00-285.00
18-8 turnings	130.00-140.00
430 bundles & solids	100.00-110.00
430 turnings	60.00-65.00

CLEVELAND

(Delivered consumer's plant)

No. 1 heavy melting	45.00-46.00
No. 2 heavy melting	40.00-41.00
No. 1 bundles	45.00-46.00
No. 2 bundles	35.00-36.00
No. 1 busheling	45.00-46.00
Machine shop turnings	23.00-24.00
Mixed borings, turnings	27.50-28.50
Short shovel turnings	27.50-28.50
Cast iron borings	27.50-28.50
Low phos.	45.00-46.00
Cut structural plates 2 ft and under	50.00-51.00
Alloy free, short shovel turnings	31.00-32.00
Electric furnace bundles	45.50-46.50

Cast Iron Grades

No. 1 cupola	47.00-48.00
Charging box cast	40.00-41.00
Stove plate	46.00-47.00
Heavy breakable cast	37.00-38.00
Unstripped motor blocks	29.00-30.00
Brake shoes	35.00-36.00
Clean auto cast	48.00-49.00
Burnt cast	37.00-38.00
Drop broken machinery	49.00-50.00

Railroad Scrap

No. 1 R.R. heavy melt.	45.00-46.00
R.R. malleable	53.00-54.00
Rails, 2 ft and under	62.00-63.00
Rails, 18 in. and under	63.00-64.00
Rails, random lengths	58.00-59.00
Cast steel	48.00-49.00
Railroad specialties	54.00-55.00
Uncut tires	49.00-50.00
Angles, splice bars	54.50-55.50
Rails, rerolling	63.00-64.00

Stainless Steel

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	290.00-300.00
18-8 turnings	130.00-140.00
430 clips, bundles, solids	90.00-100.00
430 turnings	40.00-50.00

YOUNGSTOWN

(Delivered consumer's plant)

No. 1 heavy melting	47.50-48.50
No. 2 heavy melting	35.00-36.00
No. 1 bundles	47.50-48.50
No. 2 bundles	32.00-33.00
No. 1 busheling	47.50-48.50
Machine shop turnings	24.00-25.00
Short shovel turnings	29.00-30.00
Cast iron borings	29.00-30.00
Low phos.	47.50-48.50
Electric furnace bundles	47.50-48.50

Railroad Scrap

No. 1 R.R. heavy melt.	48.00-49.00

CHICAGO

No. 1 heavy melting	43.00-46.00
No. 2 heavy melting	34.00-35.00
No. 1 factory bundles	46.00-47.00
No. 1 dealer bundles	43.00-44.00
No. 2 bundles	33.00-34.00
No. 1 busheling	43.00-46.00
Machine shop turnings	27.00-28.00
Mixed borings, turnings	29.00-30.00
Short shovel turnings	29.00-30.00
Cast iron borings	29.00-30.00
Cut structurals, 3 ft	47.00-48.00
Punchings & plate scrap	48.00-49.00

Cast Iron Grades

No. 1 cupola	47.00-48.00
Stove plate	38.00-39.00
Unstripped motor blocks	34.00-35.00
Clean auto cast	50.00-51.00
Drop broken machinery	50.00-51.00

Railroad Scrap

No. 1 R.R. heavy melt.	48.00-49.00
R.R. malleable	56.00-57.00
Rails, 2 ft and under	60.00-61.00
Rails, 18 in. and under	61.00-62.00
Angles, splice bars	57.00-58.00
Rails, rerolling	*66.00-67.00*

Stainless Steel Scrap

18-8 bundles & solids	*320.00-335.00*
18-8 turnings	*225.00-235.00*
430 bundles & solids	100.00-105.00
430 turnings	45.00-50.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	39.50
No. 2 heavy melting	30.00
No. 1 bundles	39.50
No. 2 bundles	28.00
No. 1 busheling	39.50
Machine shop turnings	22.00
Mixed borings, turnings	22.00
Short shovel turnings	24.00
Punchings & plate scrap	48.00

Cast Iron Grades

No. 1 cupola	40.00
Charging box cast	33.00
Stove plate	32.00
Heavy breakable	32.00
Unstripped motor blocks	22.00
Clean auto cast	44.00
Malleable	35.00

BIRMINGHAM

No. 1 heavy melting	38.00-39.00
No. 2 heavy melting	35.00-36.00
No. 1 bundles	38.00-39.00
No. 2 bundles	28.00-29.00
No. 1 busheling	38.00-39.00
Cast iron borings	17.00-18.00
Short shovel turnings	28.00-29.00
Machine shop turnings	27.00-28.00
Electric furnace bundles	43.00-44.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	47.50-48.00
Stove plate	44.50-45.50
Bar crops and plate	47.00-48.00
Structural plate, 2 ft	46.00-47.00
Unstripped motor blocks	36.00-37.00
Charging box cast	30.00-31.00
No. 1 wheels	38.00-39.00

Railroad Scrap

No. 1 R.R. heavy melt.	43.00-44.00
Rails, 18-in. and under	58.50-59.50
Rails, rerolling	58.00-59.00
Rails, random lengths	53.00-54.00
Angles, splice bars	55.00-56.00

PHILADELPHIA

(Delivered consumer's plant)

No. 1 heavy melting	47.00
No. 2 heavy melting	41.00
No. 1 bundles	47.00
No. 2 bundles	37.00-38.00
No. 1 busheling	47.00
Electric furnace bundles	48.50
Machine shop turnings	29.50
Mixed borings, turnings	29.50
Short shovel turnings	32.00
Structurals & plate	49.00-51.00
Heavy turnings	43.00
Couplers, springs, wheels	*53.00*
Rail crops, 2 ft & under	59.00-60.00

Cast Iron Grades

No. 1 cupola	*46.00*
Malleable	*60.50*
Heavy breakable cast	46.50
Drop broken machinery	48.00-49.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	41.00-42.00
No. 2 heavy melting	37.00-38.00
No. 1 bundles	41.00-42.00
No. 2 bundles	32.00-33.00
Machine shop turnings	20.00-21.00
Mixed borings, turnings	21.00-22.00
Short shovel turnings	22.00-23.00
Low phos. (structural & plate)	*42.50-43.50*

Cast Iron Grades

No. 1 cupola	37.00-38.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	38.00-39.00

Stainless Steel

18-8 sheets, clips, solids	290.00-300.00
18-8 borings, turnings	150.00-160.00
430 sheets, clips, solids	120.00-125.00
410 sheets, clips, solids	100.00-105.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	37.50-40.00
No. 2 heavy melting	*33.00-35.50*
No. 1 bundles	37.50-39.00
No. 2 bundles	28.00-28.50
Machine shop turnings	21.00-21.50
Mixed borings, turnings	23.00-23.50
Short shovel turnings	24.00-24.50
No. 1 cast	36.00-36.50
Mixed cupola cast	34.00-34.50
No. 1 machinery cast	39.00-39.50

BUFFALO

No. 1 heavy melting	43.00-44.00
No. 2 heavy melting	37.00-38.00
No. 1 bundles	43.00-44.00
No. 2 bundles	32.00-33.00
No. 1 busheling	43.00-44.00
Mixed borings, turnings	29.00-30.00
Machine shop turnings	27.00-28.00
Short shovel turnings	30.00-31.00
Cast iron borings	30.00-31.00
Low phos.	47.00-48.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	40.00-41.00
No. 1 machinery	43.00-44.00

Railroad Scrap

Rails, random lengths	47.00-48.00
Rails, 2 ft and under	51.00-52.00
Railroad specialties	48.00-49.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	41.00-42.00
No. 2 heavy melting	*35.00-36.00*
No. 1 bundles	41.00-42.00
No. 2 bundles	*32.00-33.00*
No. 1 busheling	41.00-42.00
Machine shop turnings	25.50-26.50
Mixed borings turnings	24.75-25.75
Short shovel turnings	28.00-29.00
Cast iron borings	24.75-25.75
Low phos., 18 in.	50.00-51.00

Cast Iron Grades

No. 1 cupola	43.50-44.50
Heavy breakable cast	41.00-42.00
Charging box cast	41.00-42.00
Drop broken machinery	49.00-50.00

Railroad Scrap

No. 1 R.R. heavy melt.	44.00-45.00
Rails, 18 in. and under	60.00-61.00
Rails, random lengths	53.00-54.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	38.
No. 2 heavy melting	36.
No. 1 bundles	39.
No. 2 bundles	31.
Machine shop turnings	28.
Short shovel turnings	28.

Cast Iron Grades

No. 1 cupola	46.
Charging box cast	39.
Heavy breakable cast	37.
Unstripped motor blocks	37.
Brake shoes	*38.*
Clean auto cast	47.
Stove plate	*40.*

Railroad Scrap

No. 1 R.R. heavy melt.	48
Rails, 18 in. and under	*60.*
Rails, random lengths	56.
Rails, rerolling	64.
Angles, splice bars	55.

SEATTLE

(Delivered consumer's plant)

No. 1 heavy melting	44.
No. 2 heavy melting	40.
No. 1 bundles	39.
No. 2 bundles	34.
No. 3 bundles	19.
Machine shop turnings	15.00-16.
Mixed borings, turnings	15.00-16.
Short shovel turnings	15.00-16.
Electric furnace, No. 1	50.

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	43.
Heavy breakable cast	38.
No. 1 wheels	35.
Unstripped motor blocks	29.
Clean motor blocks	40.
Stove plate (f.o.b. plant)	30.
Brake shoes	35.

Railroad Scrap (Delivered consumer's plant)

Rails, random lengths	33.

LOS ANGELES

No. 1 heavy melting	39.
No. 2 heavy melting	37.
No. 1 bundles	39.
No. 2 bundles	35.
Machine shop turnings	12.

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	43.00-45.

SAN FRANCISCO

No. 1 heavy melting	39
No. 2 heavy melting	37
No. 1 bundles	39
No. 2 bundles	33.
No. 1 busheling	39
Machine shop turnings	18
Mixed borings, turnings	18
Short shovel turnings	20
Cast iron borings	18
Cut structurals	41
Heavy turnings	29
Punchings & plate scrap	39

Cast Iron Grades

No. 1 cupola	47.00-48
Charging box cast	35
Stove plate	39
Heavy breakable cast	36
Unstripped motor blocks	32
Brake shoes	35
Clean auto cast	45
No. 1 wheels	39
Burnt cast	23
Drop broken machinery	45

HAMILTON, ONT.

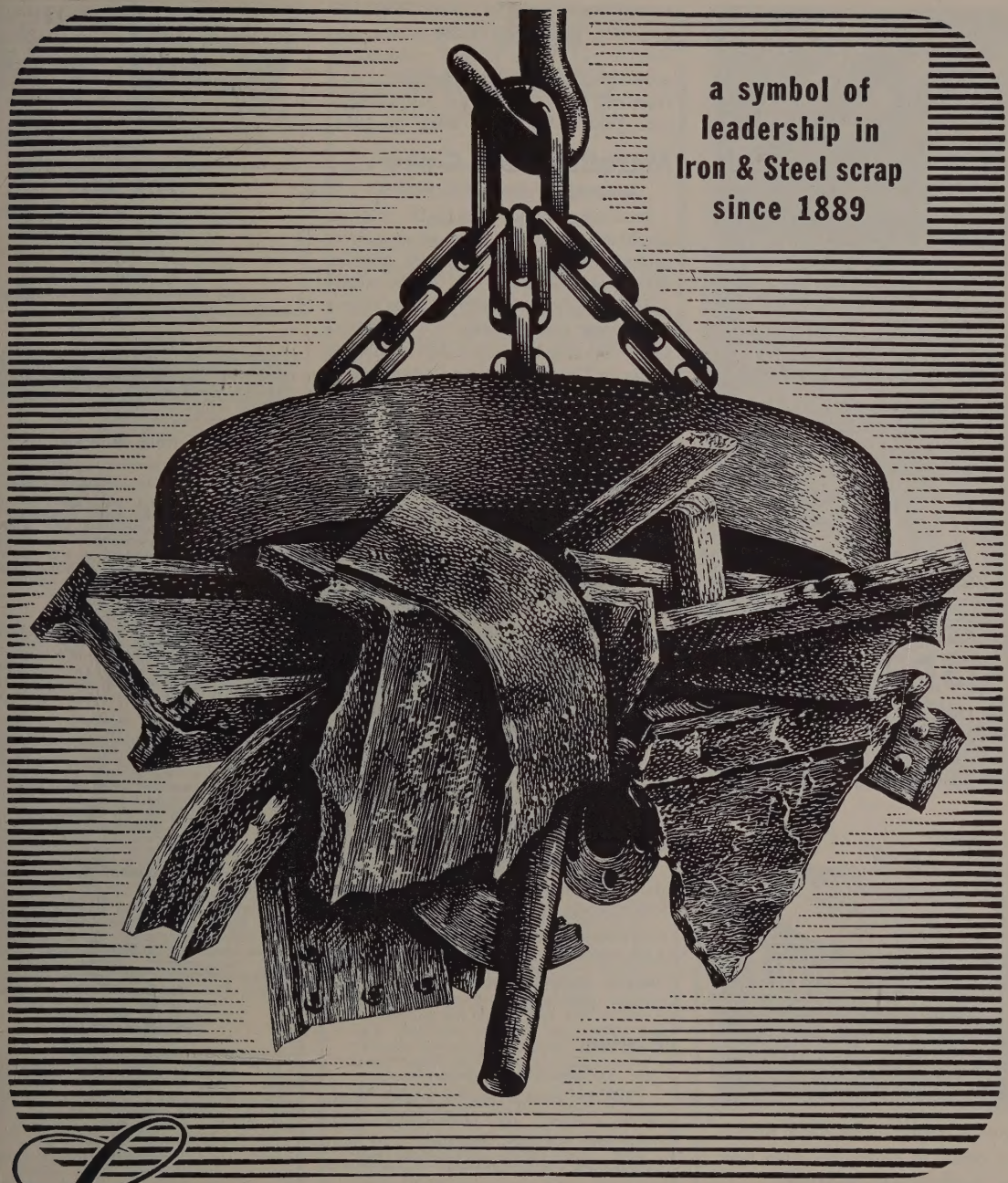
(Delivered prices)

No. 1 heavy melting	35
No. 2 heavy melting	35
No. 1 bundles	35
No. 2 bundles	32
Mixed steel scrap	32
Mixed borings, turnings	17
Rails, remelting	47
Busheling, new factory: Prepared	30
Unprepared	32
Short steel turnings	23

Cast Iron Grades†

No. 1 machinery cast	42.00-43

†F.o.b., shipping point.



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(*Concluded from page* 149)

tive and show less interest in jobbing work. They have a substantial order backlog. Shipments in that district will be 20 to 25 per cent larger this year than they were in 1954.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 142

Shortage of blast furnace coke is threatening curtailment of pig iron production in the Pittsburgh district during this quarter. In a move to improve supply, old beehive coke ovens are being reactivated. U. S. Steel Corp. is rehabilitating 500 beehives between Uniontown and Connellsville, Pa.

Steel Bars . . .

Bar Prices, Page 132

Producers of hot carbon bars could be booked up solidly, some of them through the second quarter, if they wanted to. Pressure for tonnage continues unabated with most sellers accepting new business only on a monthly basis.

In opening books for the first quarter, mills allowed for at least four weeks of overflow business from the current quarter. In some cases, they are cutting back some tonnage originally scheduled for delivery this quarter.

Requirements are highly diversified, but new business is especially heavy on automotive account.

The mills are more nearly current with demand in hot-rolled alloy bars, but deliveries in this category are becoming somewhat more extended, especially on the small sizes. Cold-drawn carbon and alloy bar shipments are reported falling behind.

Plates . . .

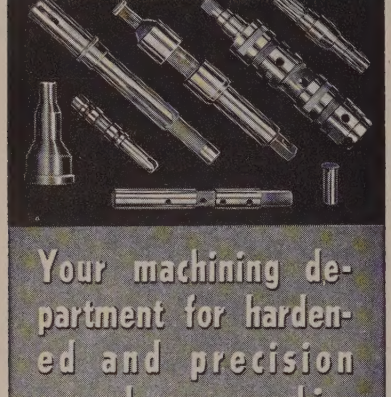
Plate Prices, Page 132

Despite measures to make them more current on shipments, plate mills will go into the new year well behind on commitments. Carry-over tonnage will average at least one month of production.

Mills are not booked farther ahead than the first quarter, except for government-rated work. Reason: They are refusing business for shipment beyond that period.

The heavy wave of plate buying started late last year in the Far West, sparked by large pipeline requirements. Since then, it has been gaining momentum steadily. Last summer railroad car demand revived after being dormant for months. So badly were the plate mills oversold at that time, they could accept little car business for shipment this year.

This will be on top of continued large requirements for heavy equip-



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PLANT ENGINEER

With Electrical background for malleable f foundry in New England. Must have had perience in supervising foundry plant mai nance. Full details will be given in personal terview. Write, giving all pertinent informa to Box 335, STEEL, Penton Building, Cle land 13, Ohio.

We desire to set up our production of small s castings on a piece-work basis instead of ho rates. We need the services of someone wh thoroughly familiar with such an operat capable of installing this system in our found Salary open. All replies confidential. Addr P. O. Box 13294, Houston, Texas.

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STEEL MILL SUPERINTENDENT—Comb tion rod and bar mill. Now actively emplo in same capacity. Age 41. Twenty-two y practical experience in steel mills. Nine years a roller. Reply Box 342, STEEL, Penton Bl Cleveland 13, Ohio.

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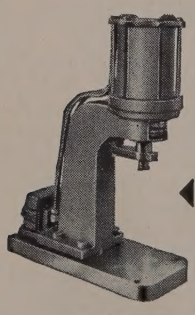

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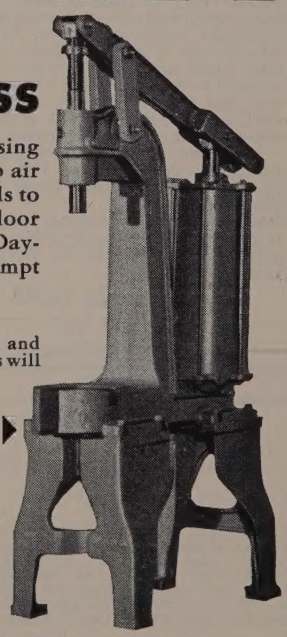

HANNIFIN

HANNIFIN CORPORATION, 523 S. WOLF ROAD, DES PLAINES, ILLINOIS

ment and machinery, construct line pipe and oil and chemical wo Standard Oil (New Jersey) will sp $300 million for refinery expans next year. DuPont may spend much as $140 million for expans in 1956.

Shipwork, which has lagged last few years, is expected to p up. The Portland, Me., shipyard be reactivated to build two Te tower radar platforms. About 12, tons of steel, largely plates, will required.

Wire . . .

Wire Prices, Pages 134 & 135

Pressure for shipments of industr wire point to low consumer inv tories. Efforts to build up stocks reported fruitless and more users inclined to order forward deliv tonnage.

Demand for spring and coil w in New England is heavy. First qu ter mill schedules are well filled. same is true of rod capacity. W strand for prestressed concrete str tures is in more active demand.

Tubular Goods . . .

Tubular Goods Prices, Page 136

The only tubular product not bool to capacity through the remain of this year is standard pipe. T item is sold largely through distri tors for construction installations.

Demand reflects seasonal fluct tions in building operations. Curre ly, building needs are supporting pacity production, but mill or books are filled for only one mo ahead.

Demand is solid for other tubu goods well into the first quarter next year.

Warehouse . . .

Warehouse Prices, Page 137

The steel supply outlook at warehouse level remains cloudy. D tributors don't know if they will able to round out stocks of she plate, structurals and bars in the fi quarter. Present information ma prospects poor for any loosening supply. Mills are accepting few ders for January shipment and slower than usual in announcing h much steel will be available af that month.

Demand from small fabricators brisk, especially for alloys a specialties, but not so strong as th reported by mills from large co sumers. A Chicago distributo shipments during the second week November were close to the all-ti high, not excluding the war peri